

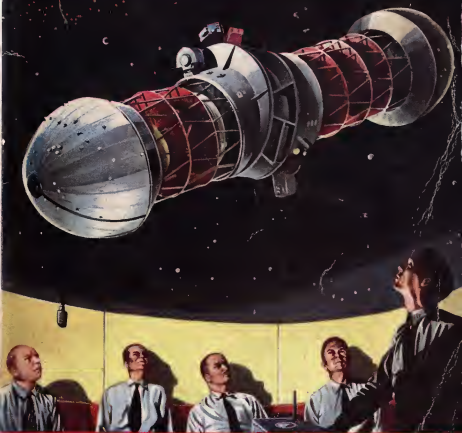
NO.
66

THE MAGAZINE OF TOMORROW

AUTHENTIC SCIENCE

FICTION MONTHLY

24



ARTICLES: PLANETARIUMS, PARTHENOGENESIS, PROJECT AIR

STORIES: R. PRESSLIE, J. BRUNNER, H. K. BULMER, etc.

AUTHENTIC SCIENCE

FICTION MONTHLY

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Editorial

I'M A LITTLE WORRIED. TOO many people are writing in to say that the magazine is a hundred per cent. perfect. It frightens me a little to read letters like that for, if they are right, where do we go from here?

But I do not believe that they can be right. Nothing subject to human influence can ever be a hundred per cent. perfect, and it is a good thing that this is so. For utter perfection means ultimate death. A thing, man, animal, fabrication, choose what you will, must forever be expanding, growing, altering and adapting to the need of the time. Utter perfection means immobility, stasis, and, more important, it can move only in one direction—down.

So I refuse to believe that the magazine is a hundred per cent. perfect. Not a hundred per cent. Ninety-nine per cent., perhaps, but that single remaining portion is the thing which allows us, you and me,

to experiment, adapt, alter and be forever striving to reach that unreachable pinnacle—the perfect magazine.

For a magazine must please all its readers, not just a few of them. Some of you would like to see more illustrations, some less fiction, others want full-length novels, and their opponents want more short stories. While a single reader remains who has a single constructive criticism to make, then the magazine is not that falsely attractive hundred per cent., and it is a good thing it is not so.

For where would be the fun in reading a perfect magazine? Where would be the thrill of striving and trying to please all of you all of the time, and not a few of you some of the time? Man is a peculiar animal. He will work for years to achieve a result and then, when he has achieved it, he will lose interest. Losing interest is the one thing I do not want any reader of

Authentic to do. Instead, I want you to have more interest and, if you have a suggestion, a criticism, something you want to say, either to me or to the other readers, then I want you to say it. It isn't much use you telling me that the magazine can't be improved. I won't believe you if you do. I don't want to believe you. I want to think that there is something, maybe only a minor detail, which we could use to expand the appeal and the readership of this, our magazine.

For it is ours, you know. Yours and mine and, in this sense, I mean all of you, readers, writers, everyone. If you think that the stories aren't as good as the ones you could write, then sit down and write one and send it to me. You could be wrong, and then again you could be right, and your story, the one inside of you, could help us climb a little higher to that utter perfection none of us will want when we reach it.

But perhaps I shouldn't let the thought of a perfect magazine worry me. Perhaps it would be better if we

thought of it as issue by issue, not as a single thing which, on reaching perfection, must remain perfect or wither. Even though the magazine is a continuity, yet each month is a form of rebirth so that we can, in a sense, try again. In that case we can strive for perfection, for every issue will be a challenge. Will it be better than the one before? Will it have slipped a trifle?

And so each month will cause each of us, you and I, to get down and find out just where we gained or where we may have slipped a trifle, and what we are going to do in the future.

But I can't do it all on my own.

I need you, all of you, to join me and push. You can help in many ways, by writing and telling me what you think of the latest issue, by letting me know which type of story you prefer, which type you didn't think as good as it should be. You can let me know which are your favourite authors, and why, and you can ask the opinions of others and let me know that, too. But whether you choose to

help me or not, I am going to try, in my own way, to turn out an issue which, even though it may not be perfect, will be as near it as I can get.

This issue, for example, is a little different from the last. Do you like the changes? The next issue again may be a little different, and the one after that different again. So, little by little, we shall try and mould the magazine until we are pleasing all our readers all of the time. The point is, there is nothing static about the magazine. There is no part of it that isn't subject to alteration if you, the readers, want it so.

For *Authentic* isn't a cold, emotionless production. It is composed of the help and friendliness of the readers and authors, it is a magazine which you can be proud to pass, with your recommendation, to your friends so that they, too, can enjoy the warm affinity between readers, authors and editor which we have known so long. And by widening our circle of regular readers we, all of us, will benefit from the influence of others who will have interest-

ing and constructive criticisms to put forward.

Now, for a word to all potential authors. I am always pleased to carefully read any material submitted to me, but for your guidance, may I make a few suggestions?

Please type your story on quarto sized paper, double spaced and with a margin of at least one inch width down the left-hand side. Number your pages, and see that the Mss. bears your name, address title of story and length in words. See that the pages are fastened together, and please enclose a stamped addressed envelope for its return should it prove unsuitable.

And now, let me join with you in wishing H. J. Campbell, the brilliant personality who for five years was your editor, all success and happiness in his new sphere of research. You all know how much he did for the magazine, and I know how much he appreciated all of you for the interest you took in *Authentic* under his editorship.

May I hope for the same interest?

PLANETARIUMS

A PLANETARIUM IS AN INSTRUMENT which literally supplies skies to order. Would you like to know how the heavens will appear in ten thousand years' time? Simple, just press a button and watch as the firmament alters to show you exactly how your descendants will see the grouping of the constellations, the nebulae, the positions of the planets and the configuration of the globular clusters.

As a means of education a planetarium is unrivalled in the field of astronomy. It is living education. The student can see the actual movements of the planets as they wend their way across the skies. He can watch the phases of the Moon, Mercury and Venus and see the real and apparent motions of the sun. He can do all this from the comfort of his chair, no matter what the weather may be like outside, and, in a few hours, he can observe natural phenomena which he could never see in a

lifetime of staring at the natural sky.

Planetariums do not merely show the movements of the planets and the apparent motion of the stars. With various attachments it is possible to show sunrise and sunset, teach geography and navigation, show the results of gravitational influences and reveal all the fascinating complexities of the universe around us.

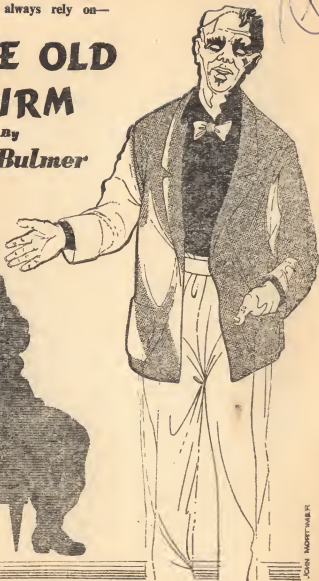
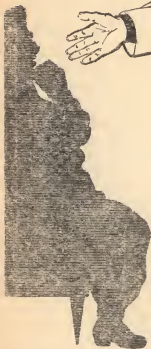
The popularity of planetariums as a medium of instructional entertainment has been proved again and again in every city in which they have been installed. At such installations special shows are designed for various audiences, from the earnest astronomical student studying celestial mathematics, to the school-children who revel in a cunningly designed "trip to the Moon."

The news that London will shortly be having a planetarium of its own will delight the hearts of all who are interested in the limitless skies around us.

You can always rely on—

THE OLD FIRM

By
H.K. Bulmer



THE OFFICE DOOR WAS A single twenty-foot block of clear plastic that became penetrable in layers as you walked through it, imperceptibly flushing with soft rose pink in unison with majestic choral music lauding the services of Vaun and Calshot. In other words, the door was a heap of antiquated junk.

"Our last customer nearly got caught in it," Calshot grumbled.

"You mean our first." Vaun punched the "finish" button on his pocket comptometer.

"What's the difference?"

"Cheer up, Cal. Vaun and Calshot, Galactic Consultants, aren't broke yet." He laughed as though the possibility were remote as a spiral nebula. "We've this character from Mizrab IV to see this afternoon, and my calculations tell me——"

Calshot grunted around his filthy pipe. "Your calculations! I knew you were born with a cyb machine in your mouth; but I didn't know it was in

lieu of brains. Not until this morning." He breathed heavily, and then coughed, his plump face going red. He finished, wheezingly: "Just let me handle the client this afternoon."

"Okay, Cal. If you wish. But I'll hang around just in case you get in trouble."

"You should take that skinny body of yours along to the ship and see about the engines. We may have a lot of jumping about to do."

"Those engines'll hold up until Venus freezes over!" Vaun began hotly. He stood up quickly, his lanky body towering over the compact Calshot.

A cracked chime bonged from the doorway and the far end began to flush its sickly shade of pink.

"A customer!" Vaun said.

"And you haven't rewound the tape. Hurry, 'or he'll get that last section of the rocket derby we recorded."

Vaun flung himself at the controls and feverishly began to rewind the tape, punched

red buttons and twiddled dials until the sonorous beat of a giant orchestra built up with the customer's progress through the door plastic. "Vaun and Calshot, Galactic Consultants," played in major and minor key, hymned from the lips of a countless host, struck echoes from instruments played by Olympian gods.

"Re-recording that quartet was a smart move," Vaun chuckled complacently, one hand resting affectionately on the tape recorder.

"It sounds like the home for strayed cats," Calshot said biliously. "And stop bouncing. Here he comes."

The man who at last fought his way through the door seemed poor recompense for all the effort so far spent on his behalf.

He was panting. His hair and clothes appeared to have been pressed hard against his spare body and the briefcase he sheltered under one arm had a freshly ripped-off handle dangling by a thread.

"That door of yours needs some attention," he remarked mildly. "Could feel pressure where the stator field hadn't quite opened the plastic enough. Anyway, didn't that type go out of fashion about twenty years ago?"

"Quite so, sir," Calshot murmured smoothly. He stabbed a button and a chair rose from the floor. "Please sit down. You wish to consult us——"

"Of course." The little man did not sit down. Vaun moved away from Calshot so that the three men were no longer in a line. There was a strongly marked crease between his eyes.

"We are specialists in re-organising planetary ecology, economics, agromomics, politics and all types of industrial commitments," Vaun said. His face held now nothing but a dedicated look that was standard procedure for any scientist. Calshot made rude remarks about his partner's devotion to science, ribbing him unmercifully; but the

bond was strong between them. Each knew the other's strengths and weaknesses. Now Calshot allowed Vaun to carry on speaking.

"What problem do you have to face on your planet?" Vaun had switched on the second tape recorder expectantly.

The little man smiled. He put the brief case down on the chair Calshot had produced from the floor. Then he wet his lips, shrugged his shoulders and said: "Pardon me whilst I bring in some further exhibits."

Before either partner could speak the little man had turned and fought his way through the plastic door.

Vaun and Calshot were left looking at the brief case on the chair.

"Well, Cal," Vaun asked. "And what's all this?"

"He's not the guy from Mizrab IV," Calshot said slowly. "And he didn't say who he was."

"Ask him when he comes back." Vaun's voice rose.

"Hey, Cal. You can't go looking inside his brief case!"

"But I am," Calshot said. The matter was settled so far as he was concerned. He opened the flap, took one look, then dashed madly to the window. The electronic guardian opened it promptly, and with a muscular heave of one short arm he hurled the brief case into thin air. Vaun rushed to his side.

They stood watching the brief case dwindle in size as it fell the two hundred storeys to the gardens below. From the opening, caught and ripped back by the wind of the descent, a thick purple vapour poured. The gas thinned and dissipated, and before the brief case was lost to their sight had ceased to pollute the atmosphere.

"He tried to gas us!" Vaun was indignant. His thinning hair yielded more ground to his raking fingers.

"Surprising," Calshot said, in a voice like a squashed jellyfish. "Now suppose you organise something for our

friend when he comes back." They left the window and stood in the centre of the room, both wearing polite, expectant smiles of good service. They had their hands in their pockets, which might have been construed as bad manners by any strict business tycoon, and those hands seemed to make quite abnormally large bulges against the material. They faced the plastic doorway, waiting.

They waited some time.

Eventually Vaun said: "He's not coming back. He thinks he's dished us and has hopped it to tell his chief." Vaun had a habit of splashing when he spoke. His sandy hair was now scattered so untidily over his head that there was no disguising at all the pinkness of his bald patch.

Calshot took out his filthy pipe, spilling dottle down his synthisilk waistcoat. He blinked. His lower lip jutted. "We might as well go out of business right away. There's no future in it for us at all;

and there may not be a future in life, either, if we run into our late unlamented friend again."

"You're too much of a pessimist, Cal," Vaun said. Each time he said that it was with the shock of a fresh discovery. He didn't believe it, except now and then. The door chimed at that instant, making Calshot spill tobacco.

They ran the tape again and watched the unhealthy pink flood the plastic. The multiplied quartet went through their song and dance routine and the customer walked in.

Vaun and Calshot, Galactic Consultants, relaxed. They took their hands from their pockets. They produced a chair from the floor. They smiled. They almost fawned.

The customer was immensely fat. His legs were as thick as they were long, and he wheezed and groaned in a fashion that completely drowned out Calshot's bubbling efforts with his pipe. The customer was an alien, with an alien's disadvantages

on Earth. And yet he exuded an air of purpose, a feeling that here was a man—an alien if you like—with something to do in the Galaxy and the determination to get it done. Looking into his eyes, Vaun and Calshot could see there, plain and frightening, the shadow of fear.

"Your letter did not mention what business you were conducting on Mizrab IV, Mister Rahming," Vaun said politely. "But feel perfectly reassured that whatever it is, we can be of assistance to you. We specialise in re-organising any planetary ecology, economics, agronomics, politics and all types of industrial enterprises."

Enterprises made it not a set speech. Rahming inclined his head, and with that simple gesture both Terrans caught a breath of their visitor's unworldly origin. They watched him, conscious of his power.

"Gentlemen," Rahming said. "My problem is so simple that I have come to

your rather—er—new company."

Vaun trod on Calshot's foot.

"Quite so, sir," he said politely.

"Please do not think I am trying to insult you," Rahming said, his thick lips curving to a quite Earthly smile. His tired eyes clouded at once and his big belly heaved as he settled his gross bulk more comfortably in the chair. Calshot moved forward solicitously.

"Shall I dial a larger chair, sir?"

"This will do, thank you. My problem is so simple that six other agencies have failed to handle it and have given up."

"Uh, quite," said Vaun and Calshot in unison.

"The problem is this. I run Mizrab IV. The planet is smaller than Earth, pleasant, Terran ecology, G2 sun. Fifty-nine light years from Alphæus. During the past few seasons our crops—our complete livelihood—have been blighted

by a weed. The weed has been destroyed three times in its entirety, or so I thought; but each time it has regrown. Now, my people are desperate. The Galactic Union have tentatively refused to extend any further credit. If they finalise that, my people will starve. I need your help. Simple, isn't it?"

"The six previous agencies," said Vaun, "They destroyed the weed?"

"Three did, on the occasions when it was routed out. The other three agencies unaccountably gave up almost before they had begun investigations."

"I see. And the weed itself?"

Rahming shrugged his tremendous shoulders. "A multifarious, many branched flower, with small blue-petalled heads. It seems to grow up alongside our normal crops and then, just about the time we begin harvesting, it flowers, seeds and chokes everything."

"You would say that on Mizrab IV this weed has an

advanced, an accelerated, time life?"

"Yes. I am not familiar with the world of its origin; it is not natural to my world. But I would concur that it goes through its life span after flowering very much faster than it does on its home world."

Rahming produced tri-di colour slides and they watched the life and death cycle of the crops and the weed.

"There's precious little food left by the time the weeds have finished flowering," Calshot said grimly. "All right, Mister Rahming. My partner and I will take your case, and we'll solve it for you. After all, we do specialise in ecology . . ." Calshot broke off abruptly, and glared at Vaun. When it came to pinching each other's speeches—

"Thank you, gentlemen." Rahming heaved himself up. He didn't seem to have any real interest. He'd gone through this so many times before that by now he had

almost come to accept the depopulation of Mizrab IV as an unalterable fact. "I hope you will be able to help my people. I shall be on Earth for a while yet, but I expect to see you on my planet in the near future. Goodbye."

"Ariverderci, sir," Calshot said. They watched the fat man plough his way through the door. They let out two sighs of relief when he reached the outside successfully, and dialled themselves chairs. Sitting down, Vaun said, in his eager, spluttering way: "Well, Cal, and what about the purple gas merchant?"

"What about him?" Calshot said gloomily. "Six agencies have fallen down on this job and me, big mouth Calshot, promise that we'd solve the problem. We might as well shut up shop."

"Oh, do shut up, Cal. We'll solve this one and then the old firm will have a reputation under its belt."

"I'd sooner have a six course meal," Calshot said.

The sky had grown overcast by the time they left the office. Vaun dialled his wrist radio to weather, and said, with a chuckle: "We should have brought our raincoats. They've scheduled rain for three hours tonight."

"We can beat the clock to the ship," Calshot said grumpily. "Then I suppose you'll spend all night tinkering with the engines. Remind me to buy you an oil can for Christmas."

Rain had begun to fall in large, splattering drops by the time they reached the new spacefield. Their ship, patched, worn, old and obsolete, and yet in perfect condition, lay like a slug on the wet concrete. The outer airlock valve opened and they stepped up the ramp.

A shadow moved in the shadows by the airlock. Vaun went on, unheeding. Calshot, his head on a level with Vaun's shoulder, paused. Then he clasped Vaun round the waist, threw his friend violently to one side and followed through with the motion,

ducking under the livid streak of flame that came from the shadows. Vaun went head-over-heels across the ramp and onto the concrete beneath. Calshot straightened his stubby body, about to essay a mad charge at their assailant, when a black form rushed past him on the ramp, knocking him off. By the time he had scrambled to his feet, the attacker's footfalls were dying in a machine-gun staccato on the concrete walkways beyond the farther sheds.

Calshot drew in a deep breath. He frowned after the vanished gunman, then bent down and sorted out Vaun's whereabouts for him.

"Come on, Brains," he said good-humouredly. "Let's get in the ship and find out just what sort of booby-trap our mysterious friend has left us."

Vaun panted and puffed, his dignity lost. He went up the ramp, seething, and just as Calshot was about to enter, said, frigidly: "And

suppose the booby trap is right here in the airlock?"

Calshot backed out fast.

"Well?"

Vaun rummaged in his pockets, came up with a small detector, its scale faintly greenish in the dusk. He ran the probe delicately around the airlock door, checking seams and electrical connections.

"She seems clear of any nucleonic object," he said at last. "Reckon we can check any other as we go through."

Calshot chuckled. "When we were in the Space Rangers," he said, a note of reminiscence creeping into his voice, "we became rather proficient at doing just that. Come on."

They went in, carefully. Flashlights showed them the interior of the lock. They checked every relay and circuit before they used it, and penetrated right through to the cramped control room without finding a single thing wrong.

"Must have interrupted him just as he was about to start

work," Vaun said, bubbling over once again. "Okay, I'll start on the engines. If we leave in the morning as arranged, then I'll want most of the night. Work, you know, something you may have once had a slight acquaintance with in the dim and distant past."

"I'll happen by and pick up the pieces if you do find a booby trap," Calshot said. His lower lips was sticking out again. His pipe appeared as though by magic in his fingers.

Vaun laughed and left. He was still as vivacious in the morning when the engines were one hundred per cent. and they blasted off on the first leg of their journey. Alphæus was the first call, and then the fifty-nine light years to Mizrab IV. The journey was satisfactorily completed by the following afternoon, and they stared out of the viewports on the world of Rahming.

"You can see we'll not be finding much of help here,"

Calshot said. His fingers tapped the portsill and Vaun, looking annoyedly at them, moved pointedly away.

"I've tested for atmosphere and she's okay. We'll find gravity a little less, which should prove a gift for your weight. You're growing quite a paunch these days, Cal."

"At least I'm not wasting away to a human skeleton, Brains," Calshot retorted acidly. "Come on, then, if we must go out onto this horrible planet."

"You'll feel better when you get some of that extra fat off, Cal, you wait and see."

They found the local headman—he was the mayor and knew all about their arrival—at a modern glass and plastic building in the centre of pleasant lawns and gardens. They discussed the problem, and then went along to where men were working, planting the fields in readiness for the planet's short winter of hibernation.

"You see," Jorgen, the mayor, said, "Mizrab IV has a four-season year, all right, only they last about one month Earth-time. That means we can grow tremendous amounts of food, which is of a high quality, although some critics call it coarse, which I assure you, gentlemen, is a downright lie and a slander on our planet. We can dehydrate and concentrate the food and ship it to various planets who have a food problem. We plant the seeds in the autumn, let them lie all winter and then start harvesting in early summer. It's a nice set-up." His fat face clouded. "Or was, until this damned weed sprang up."

"Have you any specimens of the weed you can show us?" Vaun asked.

"What? Of course not! We burn every single bit of the muck we lay hands on." Jorgen quivered at the thought. "But I can show you films——"

"Okay. We've seen tri-dis of the stuff. Right you are, Mister Jorgen. Thank you

for being so helpful. We'll contact you later on."

"Very well, then," Jorgen said, uncertainly. He was obviously surprised at Vaun and Calshot's abruptness. But then, he had had no dealings with them before. Back aboard their ship, they poured a glass of beer for Calshot and an orange squash for Vaun.

"Well, what do you make of it?" Vaun asked.

"We ought to go home. These people plant seeds, leave them through the winter, then when they come to harvest them next summer, find a mysterious blue-flowered weed all mixed up with the crop. There's no method of getting the seeds into the ground by natural dissemination, because they're all destroyed by the previous agencies. But the weeds still grow."

"What about a spaceship, sweeping low and sowing seeds broadcast?"

"No one has ever seen or heard a ship doing that. They thought of the idea and set watches. Think again."

"Mutations?"

"Hmm. Hardly likely. But it's a thought. Let's dig out our sources on plant life and find out where this weed originated. That might give us a lead."

The old firm of Vaun and Calshot consulted their advisers—a comprehensive micro-tape Galactic encyclopædia—and eventually agreed to disagree on the home planet of the blue weed. Through the viewport they could see the long orderly rows of fields, all neatly ploughed, with shining tractors marching sedately up and down, sowing seeds to lie in the stiff earth until the month-long spring should stir them to life.

"Fancy getting three springs a year," Calshot said ruminatively. "My thoughts would be turning frequently, I'm afraid."

"Your sex life is deplorable as it is," Vaun grinned. "Out here you'd be prematurely old. And, remember your paunch."

"At least I can comb my hair without a search-party," Calshot puffed between spurts of smoke. "And I still say this blue weed comes from Aldebaran XI."

"Nonsense. Comes from Prestonwell. Typical culture."

Impassé. And there the matter rested for a while.

Until, later on, after quite a few beers and orange squashes, the other spaceship came down in a falcon swoop out of the sun.

Radar had it spotted and tracked it down, computing it to be following a path that terminated on the same area of planet occupied by Vaun and Calshot's ship. The old firm reacted fast. Vaun had his motors running and the ship lifting on stilts of power, up and away from the threatened spot. Their radar tracked the oncoming ship. The screen showed a blip, a dot, a cigar-shape, a flaring monster that fanned down, squatted on its haunches, and then raced away upwards out of the atmosphere. Minutes later the

long drumroll of sound buffeted around them.

The bomb struck where they would have been.

Looking at the cloud, Vaun laughed contemptuously.

"They were so confident they didn't even use atomics."

"Well, it's no use our going after them in this old crate," Calshot said. "I don't like it."

"This means we're getting somewhere." Vaun's eyes blazed. "The answer is on this planet, somewhere."

They landed the ship, ate a meal and then made contact again with Jorgen. The Mayor's face was pale. He led them on a conducted tour of the whole operation going on outside, from the storage bins where the seed was received from last year's harvest supplies, through to the actual planting machines in the field. Armed guards scowled at them throughout the entire procedure. A mouse couldn't have broken that ring.

"Why didn't you weed the fields when the weed first showed?" Vaun asked.

Jorgen shrugged. "The fields look normal, as you have seen from the tri-dis, until a few weeks before the harvest. Then the blue weed springs up at a fantastic rate of growth. By the time we come to harvest, the good crops are choked out. When the weed flowers——" His voice trailed off miserably.

His assistant walked across, a yellow paper in one plump hand. The man had an open, intelligent face, clouded now, like all those on Mizrab IV, with the defeatism engendered by this fight against an unknown, plague-spreading enemy.

"Cable from Mister Rahming, sir."

Jorgen took it, nodded and said to the Terrans: "Mister Rahming is expecting to return in two days."

The old firm knew what he meant. At the end of those two days they were expected to have results. Vaun scratched

his nose. Unexpectedly, he asked: "How much mining do you carry on here, Mister Jorgen?"

"Mining? None, or practically none. We are an agricultural world. Our wealth lies in the soil, not the rocks."

"Hmm." Vaun nodded to Calshot and the two partners walked a little distance away.

"You onto something, Brains?"

"Maybe. Look, Cal. There's been a pattern to this whole thing, all kidding aside. The purple gas. The guy who was in the airlock. This last bombing attack. All that adds up to one thing."

"Yeah. Big money. Power. We'd better get out of this before it's too late . . ."

"Oh, talk sense, Cal!" Vaun said impatiently. "Why should anyone want to do this to us, if it wasn't because we might solve this problem here? Remember, three other agencies were frightened off before they'd started. The others did the obvious things. They

rooted out the blue weeds when they appeared. Instituted guards. Checked personnel working in the fields. Floodlit some fields, too. But they overlooked one thing, assuming, that is, that they were shot at and gassed at."

"This is a who-dunit, eh?" Calshot groaned. "I didn't get any readings on that ship; too fast."

"I've got an idea." Calshot grinned when Vaun said that. The old firm thrived on Vaun's ideas. "We just have to check with Presonwell about the weed——"

"With Aldebaran XI."

"Oh, look here, Cal. It's obviously Prestonwell." Vaun spluttered in his eagerness, his face paling with his earnestness. Calshot puffed his pipe and stuck his lower lip out. "Aldebaran XI."

"Well, wherever it comes from," Vaun exploded, "I can rig this doohickey without worrying. You get permission from Jorgen to go into any section without prior

questions and collar any keys you need. I'm going back to the ship. Got some engineering to do."

"Don't forget your can opener," Calshot sent after him, but his heart wasn't in the gibe. He went back to the Mayor, who was talking quietly with his assistant.

The thing about Vaun, Calshot ruminated, was that he was so darned brilliant you never knew just what angle he'd go off on, and the next you knew you were riding along on some fantastic hair-brained scheme. He sighed, and set about getting *carte blanche* and keys from Jorgen.

The thing about Calshot, Vaun's thoughts came spurt-ing up, was that he was such an old stick-in-the-mud. Solid and dependable, and yet just failing to see the wonders that science really held out. He sighed, and set about throwing electronic and nucleonic gadgets into a pasted-up scientist's nightmare. He was

happy, his forehead gleaming with exertion.

By the time that the sun had set—and although the planet had short seasons the days were thirty hours long—they had checked through every stage of agriculture on the most strict inspection. They found what every previous agency had discovered or had caused to be set up. There was just no way for the weeds to be surreptitiously sown by any agency. In that case, if the weeds had been totally destroyed, seeds and root and branch, then they should never reappear the next season. That they did was only too plain.

Vaun had most of his equipment spread in a tangle across the cabin, and Calshot grumbled as he almost lost his beer against an impersonal meter-face Vaun had just erected.

"What's all this rubbish, Brains?"

"Got that cupful of seed?" Vaun was intent. He held out

his hand and Calshot obligingly placed in it the little sample pile of seeds Jorgen had given him from the hoppers. Vaun poked it around in the palm of his hand.

"Wheat," Calshot said succinctly. "Just plain, ordinary wheat saved from last year's crop. They went through it with a fine-tooth comb, making sure no weed seeds had blown in. It's one hundred per cent. wheat."

"It looks one hundred per cent.," Vaun said, speculatively. His eyes gleamed at Calshot and his plump partner groaned. He recognised the old routine.

"Well, if you're onto something, I'm going to catch some shut eye."

"If I'm right, Cal, you'll be out with me tonight, checking up."

Calshot said: "Oh, no," and fortified himself with more beer. But however much the two might joke among themselves, they knew well enough that the problem on this planet was tough, and

was deadly serious to the inhabitants. If the weed sprouted again this season, then the people would starve. Galactic Union didn't fool when they threatened to cut off credit. And if that happened, then Mizrab IV might as well put up the shutters. Rahming was coming back, and they had to have results to show him. Calshot couldn't see what was going to happen next; but he was prepared to go along with Vaun—all the way.

That brilliant exponent of scientific lunacy, as Calshot inelegantly phrased it, was busy pouring the wheat seeds through a hopper—rigged from an opened can—into the convoluted guts of his machine. Calshot recognised the cathode ray screen, and odds and ends of components; but what it all was he hadn't a clue. Vaun was making little squawking noises, reminding Calshot of a hen pecking over those seeds, and appeared to have six arms, all flying in and out of the electronic nightmare

he had created. Calshot drank more beer.

Vaun straightened up after a quarter hour's work. His hair—what there was of it—was over his face and his eyes looked like jet orifices. Calshot knew the signs.

"That explains that," Vaun said. "Now we have to go along to the storage bins—you did say that Jorgen was seeding that fresh field tomorrow, didn't you?" he queried sharply.

"That's right. They're starting early and hope to get the whole acreage finished before sundown. Jorgen said they were using seed that had been in bond since last season."

"Well, we'd better hurry. Bring a flashlight."

Calshot knew better than to ask questions. He finished his beer, selected a large flashlight and put on a thick coat. Nights got cold. Then they went out of the ship together and across to the huddle of farm buildings.

"Keep quiet," Vaun said softly. "I'm expecting to catch

a blighter hanging around the seed containers."

"This seed was put here at the end of last season after it had been inspected, and hasn't been touched since," Calshot whispered at the shadow that was Vaun. "I checked the seals on the locks today."

"Keep quiet," Vaun whispered back. "Cut around the back of those bins and lie low."

"All right. All right," Calshot grumbled. "Who's the man of action around here, anyhow?"

They parted and settled down to a watchful vigil. Calshot wasn't too worried over Vaun. Whatever plan the brainy guy had cooked up, this end of it demanded action, and Calshot felt confident they could handle anything this planet could offer. Not that he'd ever think to mention that to Vaun, of course.

They had been only just in time.

Overhead the corrugated metal roof of the big building shut out the stars, casting deep shadows across the serried rows of bins. Each bin must have been at least fifteen feet tall, with a light metal ladder running up the side leading to the hopper at the top. The door through which they had sneaked now blacked out again as a fresh intruder came in.

"I know that we bye-passed the guard easily enough," Vaun murmured. "But this guy must be good to get past."

"You know the opposition is tough," said Calshot's hoarse whisper. "Now shut up. He's coming this way."

The area of deeper darkness that was a prowler moved closer. There was the muffled chink of metal on metal. Then a dim flash of light glanced from the smooth flank of a wheat bin. The two Terrans waited.

The intruder was laboriously climbing one of the ladders leading onto the top of a bin, and his slow pro-

gress was explained by the bulky sack he had slung over one shoulder. His dark figure stood up with a little grunt, then they heard the lid of the hopper clank open.

"All right," Vaun said sharply. "We don't want any of that stuff in the bins. You can come down now, whoever you are." He shone the light from his torch full on the standing figure atop the storage bin.

There was a shouted oath. The man flung an arm across the white oval of his face, brilliantly picked out by the merciless glare. The next instant he had jerked the other arm up and a shot crashed out, magnified and thunderous, in the confines of the warehouse. Vaun staggered back and dropped the flashlight.

Darkness dropped back like a thunder cloud.

Calshot catfooted around the bin. Vaun said, quickly: "I'm okay, Cal. Smashed the lamp."

Calshot didn't reply. He

kept his hand ready on his flashlamp and, with his gun in the other fist, went up the ladder. He might be plump; but he wasn't as fat as the inhabitants of this world—or as fat as Jorgen.

The Mayor started on down the treads, his feet elephantine, creating a careless racket. He wasn't frightened of them, not with a gun in his fist.

Coming down like that, he ran straight into Calshot. Calshot lifted his torch and slashed the man across the head with his gun. He shone the light onto the falling body. Jorgen pitched off the ladder, went headlong downwards.

Then Calshot let out a yell of annoyed frustration.

From below, Vaun's voice came up in a startled shout, abruptly cut off as Jorgen's gross bulk smashed into him. Both men crashed to the concrete floor. All the wind was knocked out of Vaun. By the time he had picked himself up, Jorgen's dumpy silhouette was cutting off the

light from the doorway—then the Mayor had vanished.

"You're a brilliant specimen, Brains!" Calshot said angrily. "Why didn't you grab him?"

Vaun panted. "Grab him! You dolt! Why didn't you knock him out instead of giving him a love tap?"

"That would have paralysed any normal man," Calshot said. "He must have armour plate round his head."

"Well, come on. Let's get after him."

Vaun stooped down, scraped up something from the floor and then ran out after Calshot. He stuffed the handful of seeds from Jorgen's sack into his pocket as he went through the door. He was smiling. He had been vindicated. Now it remained to catch Jorgen before he got word to his employers and they reacted. And Vaun had a shrewd suspicion just who those employers were.

Vaun and Calshot, Galactic Consultants, had done it again. This time, legitimately, which

was nice. Their previous work, before they'd founded the old firm, had been anything but legal. Both of them could feel very satisfied. Vaun most certainly did. Calshot wasn't quite sure how he felt, except that he was very thirsty.

They didn't find Jorgen. He had disappeared in the backwoods of the planet and they knew better than to attempt to track a man on his home ground. Vaun went back to his machine and began carrying on with it again, this time using the seeds from Jorgen's sack.

"They're seeds of the blue weed, of course?"

"That's right," Vaun said. "But to any outward inspection they look like wheat seeds. And if you looked in the bins containing other types of seed you'd find weed seeds there masquerading as genuine seeds."

"Your machine can tell them apart, though?"

"Yes." Vaun looked smug. "Simple, really. I checked that a vibrational wavelength from

normal seeds gave a typical pattern on the oscilloscope. The weed seeds give back a different pattern. Their own pattern, and one which can be compared with their origins. Now we'll find that the weed comes from Prestonwell."

"I bet you'll find they come from Aldebaran XI."

"We'll see. Meanwhile, what about friend Jorgen and those he was working for?"

The answer to that came when Rahming landed. He stepped from his private ship the following morning, plump and wheezing. The sun had already brought out a line of sweat along his forehead; but he seemed affable enough.

"Well, gentlemen," he greeted them, standing with a small group of his advisers around him. "I suppose you'll tell me that you're forced to give up the assignment for various reasons, and you'll be blasting off?"

"Not quite, Mister Rahming." Vaun was bubbling again. Calshot nudged him.

"That is interesting." Rahming looked tired, as though he'd spent hours fighting a lost cause. "I should inform you that Galactic Union will cut our credit—flat—if the crops fail this season."

"The weed won't bother you," Vaun said. He ignored the gasp from the aliens, and went on: "Your man Jorgen was in the pay of certain interests. Those interests will become plain to you as I proceed."

"Please do." Rahming had dropped his attitude of indifference. He was vital, alert, hanging on Vaun's words.

"Jorgen had been planting the weed seeds in the bins prior to sowing. He had the best chance of access to the warehouse. If challenged, he could get away with a ready excuse. Our arrival threw him off slightly, and he was forced to sneak in and try to plant the killer seeds in the bins during the night. We caught him, but he got away."

Calshot grunted hard at this.

"The other agencies," Vaun went on blithely, with a side frown towards Calshot, "were either frightened off by these mysterious powers, or they carried out normal anti-pest procedures as practised by agronomic experts. But Vaun and Calshot are something extra special in the way of experts." His smugness was fairly dripping off him by this time. Rahming fidgeted, and Calshot coughed warningly.

Vaun went on: "This planet has vast mineral resources, Mister Rahming. Untold wealth lies below the surface. It was an easy thing for mining interests to discover this; there's no secret made of your sole application to agriculture. We'll find, I have no doubt, that all the other agencies were scared off by mining syndicates, or their hired gangsters, and we ourselves were subjected to a number of attacks. The seeds lay in the ground all winter, and then, when the spring came, grew slowly alongside the regular crop."

Calshot was beginning to tie things in now. And the more he did so, the more important became the discovery of the exact world of origin of the weeds.

"Seeds behave differently on other worlds from those nature designed them to work on," Vaun said. "That's common knowledge. You have to select and breed and reject very carefully before agriculture can decide to use any crop off its native planet. But, as we are agronomic experts, we know perhaps a little more than even the best of other experts." He chuckled.

"The weed seeds had an accelerated time scale after they reached a certain growth," Calshot said slowly, puffing his pipe. "And you couldn't tell them apart from the regular crop. When you could, it was too late."

"Precisely, Cal," Vaun said. "The people who organised this had taken this seed, and had moulded it by evolutionary and mutational forces into a complete chameleon of

other seeds, so that it could be fed into your bins and sown onto your fields without anyone ever realising what they were sowing. Call it adaption, a super-syndrome, call it what you like. It's known in the animal kingdom as a common attribute—this time it was artificially introduced to a plant. And I'm pretty sure that the seeds came from Preston——"

"Aldebara——" Calshot cut in, in turn to be interrupted.

"But I had the weed checked on Earth," Rahming said. "You call it Michælmás Daisy. Quite common there. Jorgen—and don't worry about him, we'll find him—must have been receiving instructions from the Terran Mining Syndicate."

Vaun and Calshot looked blank. Then they looked shocked.

"Earth?" Vaun stammered.

"Us?" Calshot echoed.

"Yes." Rahming's fat face was grim. "Earth has been trying to get concessions to

mine here. I'd always refused. So they stooped to this."

"Well," Vaun said indignantly. "They tried to kill us, and we solved this problem for you. So at least you know that not all Terrans are——"

"Of course not, Mister Vaun." Rahming was smiling now, for the first time since they had known him. "I owe you a great debt, and I shall pay your fees. But it is nice to know who I am up against. I think that the Terran Mining Syndicate may find me willing to talk terms, at a price." He chuckled then, and his big belly heaved.

"They're smart," Vaun warned. "They developed this killer weed from Michælmás

Daisy. One sackful in a bin was enough to ruin the entire crop. You'll——"

"I'll be enough to ruin them, too," Rahming wheezed.

Vaun and Calshot looked at him and decided that he would, too. Then they solemnly shook hands.

Vaun and Calshot, The Old Firm, had pulled off their first case. Now they could get that junkheap of a door fixed. Now they could branch out, become big-time—both their imaginations ran away with them, plans bubbling out of Vaun, to be pooh-poohed by Calshot.

The Old Firm were at it again.

7th ANNUAL MIDWESTCON

The 7th Annual Midwestcon will be held on May 26th and 27th, 1956, at the North Plaza Motel, 7911 Reading Road, Cincinnati 37, Ohio, U.S.A. Full details from: Don Ford, 129 Maple Avenue, Sharonville, Ohio.

It was worth it to be with him—

WHEN HE DIED

BY ANTHONY BLAKE

I STOOD IN A PARK AND stared at the leaves rustling about my feet. They were dead leaves, dry and sere, brittle and curled, and yet more colourful in death than they had ever been in life. The wind caught them and sent them scurrying over the faded grass in company with scraps of paper and the other inevitable litter of public places.

It was a chill wind and I shivered a little as it bit through my clothing. I stared up at the sky, surprised at its emptiness, and around me at the few people walking in the park. They were, as I expected, but it was hard not to stare. Fashions change so quickly that what is admirable today is ludicrous tomorrow. They ignored me and I forgot them in the urgency of other things.

The wind was wrong, the

leaves were wrong, the setting was right, but that was all. It should have been spring, with warm breezes and green leaves nodding above newly-bloomed flowers. The sky should have been bright and clear, not sullen with rain-heavy clouds. I had arrived at the wrong time.

Fear joined forces with the wind so that I shivered beyond all reason. Six months didn't matter. Six months either too soon or too late and I would still be within the margin of safety. But if I had arrived so far from the determined point, then it need not be merely six months. It could be eighteen or thirty. One way wouldn't matter, would be all to the good, but the other . . .

I stooped and grabbed at a fragment of newspaper as it fluttered towards me. I straightened and smoothed it

with trembling fingers. I blinked at the date, holding the small print close to my weak eyes, then felt a sudden, tremendous surge of relief. The date on the paper was the 15th October, 1957. I had been born on the 23rd July, 1931. I was eighty-seven years old, and so had travelled back sixty-one years. But that wasn't important.

I had arrived with two months to spare.

Strange how things have their own importance. I had worked continuously for fifty years to perfect the time shuttle, and my object was, to any other man, ludicrous. The discovery was important only to a few savants like myself because, while objects could be sent back through time, the shuttle itself could not. It was strictly a one-way trip and that fact made the shuttle useless. Who would want to travel to an earlier age with no possibility of return? Who, other than a fool or a man obsessed?

I thought about it as I walked slowly from the park and into the streets of the city. Slowly, because I was an old man and had long since lost the resiliency of youth. Around me ground cars, remembered from my boyhood, but now strange, snarled and roared along the laden roads. They frightened me a little, those cars. It would be so easy to have an accident, to be struck and injured and carried off to a hospital. Medical science had not yet learned the secrets of quick-healing, and such an accident could keep me helpless for months. And I had no time to spare.

I entered a cafe and ordered coffee, paying for it with some of the old currency which I had taken so much trouble to collect. I sat and sipped at the brew and stared through the windows at the street outside. The scene was familiar and, at the same time, strange. The buildings were as I remembered them, but dirtier by far than I had imagined.

Sixty years is a long time, and memories tend to fade and become overlaid with nostalgia. The city I saw now was not the city as I remembered it, but then I had looked at it through the eyes of youth, while now I stared at it with the eyes of critical age.

I smiled as I drank the coffee, wondering what my fellow workers would be saying at my absence. To transport my mass had drained the potential of the pile, and the cost of replacement would be enormous. In effect, I was a criminal, a saboteur, a self-centred fool without regard for others. But I didn't care.

My motive, to me, was all important.

Have you ever known regret?

Have you ever known what it is to sit and smile and make conversation, while all the time your eyes are burning with unshedable tears, and your heart is torn and aching inside of you? Do you know what it is to realise that all

your hopes and plans and aspirations have dissolved like dead-sea fruit in your hands, and that all the care and caution you were once so proud of has reared up before you and is making your life a hell? Have you ever felt the sickening knowledge that nothing you can do now can possibly matter, because it is too late?

I felt like that the night my father died.

I loved my father. Strange to hear a man say that? Not so strange when you realise that he was the only parent I had ever known. He was more than just my father. He was the man who stayed up all night to mend my bicycle so that I could ride out with my friends on our Sunday excursions. He was the man who collapsed at work while earning the money to keep me at school instead of letting me take a blind-alley job so that he could reap the benefit of my wages. He was the man who, with ruined heart and rasping lungs, crept painfully

through life without complaint so that I shouldn't worry about him.

Not that I ever did. Children have an impatient cruelty strange to an adult. It was hard for me to wait for him to catch up with me when we were out walking. I felt embarrassed at his slowness and ashamed of the way he would halt and clutch at the railings for support, with his poor face all blue and his poor hands all swollen and shapeless. Pain made him short-tempered at times, so that we quarrelled bitterly as only youth and age can quarrel. I had no tolerance. I was young and fit, and knew everything in the world worth knowing. I had no time for his advice. I knew best, and so it was that, after being bruised by the world, I tended to blame him for what he could not do.

I blamed him because we were poor while others were rich. I blamed him for his ill health and his apparent stubbornness, not realising

that, to the old and ill, small pleasures are valuable. So that, when he lay gasping and ill, I had no sympathy with him. It was his own fault, I said, for being so foolish. If he was ill then he should go into hospital and not stay at home making himself a burden to me and shaming me before my friends. I was hard. I was bitter. I was a child.

Tolerance came with age, and I regretted the things I had done and the things I had said. Now, instead of as in the past, my plans included him as well as myself. But they were nebulous plans. One day I knew that I would have money. One day I would give him as much money as he needed to enjoy himself. One day, always one day.

But that day never came.

I was cautious and looked far ahead. A little now or a lot later? Should I dole out what I could afford now, or save it until a later date when I could afford more? Saving and thrift caught hold of me so that I almost begrudged

the little I gave from time to time. Later, I told myself, later, when I had what I thought necessary. Then we would both enjoy the benefits of my thrift. Later. Always later.

He died before that time ever came.

Losing him was like losing a part of myself. I was away at the time, working north at what was to be my profession, and we hadn't seen each other for months. The news came in a letter from a stranger, and that same letter contained a sizeable sum of money. But the money meant nothing to me then.

I travelled all night and saw the grave. I saw our old neighbours, too, and I was not proud of the way they looked at me. I questioned them and found that he had not died alone. A stranger had been with him, an old man, and they had lived together for a short while. He had been there at the death and had arranged the interment. I didn't know who

the stranger was. I never saw him, but I had other things to worry about than unknown strangers. My father was dead, that was enough, and I hadn't even said good-bye.

And now it was too late.

Time, they say, heals all wounds, and time was all I had. It was a slow healer. I dreamed of my father and saw him in a thousand ways. The back of a stranger, a song, a scrap of conversation, a place name, a thousand things which made him suddenly real and alive again so that I seemed to hear his voice and see his smile and feel again the pain of my unbearable loss.

Work offered an anodyne, and I worked like a man possessed. The money he had sent me—I never thought of it as other than his gift—enabled me to forge ahead in my studies so that I soon became an expert in my field. Atomics was still new enough to offer splendid opportunities

and I rode the crest of the wave. I was respected, fairly wealthy, with access to top-secret information and the world at my finger tips. I should have been happy. I wasn't.

Maybe if I had married and had children of my own I would have rid myself of the incubus which haunted me. Maybe I was too introverted, too taken with living in the past even while working towards the future. I knew enough of psychology to know that I was suffering from a guilt complex, that I was tearing myself apart with all the thoughts of what might have been. The little things I could have done, had intended to do, but had left too late.

And there was no surcease for me in all the world.

Time passed as time does. My hair grew white, my shoulders stooped, my eyes grew weak and my hands lacked their sureness. Atomics spread throughout the world and spaceships soared to the Moon. New discoveries were

made, and the final secrets of nature began to yield to our probing.

Then two things happened almost simultaneously and altered all my life.

Vendaris, after thirty years of experimentation, discovered a serum which, at first glance, promised immortality. It was a complex molecule chain which, when injected into the bloodstream, arrested the ageing of the tissues. The serum carried its own safeguard, in that it brought sterility. Men could live for ever, but it would be a barren existence. It was good that way. Young couples could mate and have their children and then, when in their prime, take the serum. The snags were minor. A fresh injection was needed every seven years or ageing would re-commence. And the serum had to be new; storing it caused degeneration of the complex chain.

The second thing was that I discovered time travel.

I was eighty-seven then, sixty-one years after the death

of my father, and yet time still had not healed the hurt of his passing. It was inevitable that I should use the shuttle to return back in time so as to see him once more.

And I had arrived just two months before he was due to die.

I finished my coffee and left the cafe. I walked down the familiar streets and came to the old house. My heart beat with a peculiar excitement as I reached it, and for a long time I stood outside. Within the house I knew that my father would be sitting in his old armchair. Perhaps he would be reading, or listening to the radio, or perhaps he was busy making himself a cup of tea or cooking one of his little meals.

My eyes stung as I thought of him in his loneliness. Old, ill, seemingly unwanted by his only son. Old myself, I could now appreciate the terrors of age. The sleepless nights, the failing memory, the discomfort and pain of a

body which was breaking down faster than the mind it contained. For a moment I felt the impulse to go. To walk away and not to resurrect the ghosts of the past. I fought the impulse. This was not the past, not now. This was the present, and my father was alive and I was here to comfort him if I could.

But it took more courage than I expected to knock upon the door.

He was the same. It was incredible, but he was just the same. The same poor, bluish hands, the same wheezing in his throat, the same deep-set eyes creased with wrinkles and yellowed with illness. He stood and looked at me and I, after my first involuntary step forward, remembered who and what I was.

I was his son—but he could never know it. He was my father—but he was young enough to be my son. To him I was an elderly stranger.

It was easy to make friends. I knew him—who could know him better? I introduced my-

self as a friend of his son and he made me welcome, as I knew he would. He invited me in and offered me tea and, to me, that was the sweetest moment of my life.

I almost cried as I fingered the well-remembered cups and stared at the old, familiar room. Its poverty startled me, used as I was to twenty-first century luxury, and little things threatened to trap me at every moment. I knew too much. I remembered where the sugar was kept in its old tin, where he used to keep his milk, the place to find the matches. It was hard not to speak of mutual friends and incidents about which no outsider could know. I had to force myself to act as a stranger, and yet all the time I wanted to throw my arms around him and tell him who I was.

We talked of his son and I felt shame as I listened to the quiet pride in his voice. We had argued, he and I, and I had been bitter of the opinion he must have given others

about me, but now I knew that to be all wrong. He loved me, was proud of me, and his only complaint was that I left him alone too long.

I knew why he was alone. I knew what I was doing at that moment, the I that was young, of course, not myself. I was working and saving, enjoying myself in my fashion, and salving my conscience with the knowledge that "one day" I would make amends to my father for my neglect. That day had been sixty-one years in the coming and, now that I was here, he couldn't know who I was.

The two months passed all too quickly. I moved into the old house and the money I had brought with me made life as pleasant for him as it could. It wasn't much. I had forgotten that, to him, things would not be the same as to me. Money from a stranger was not the same as money from his son. The company of a stranger was a poor substitute for the com-

pany he longed for. It was not the same.

And I was conscious all the time of the passing days which would terminate his life.

That was the worst part of it. To see him again, to talk with him, to share his simple pleasures, to walk with him and be aware of his presence. And all the time know that he was dying as I watched him. To know the exact hour of his death and know that there was nothing in the world I could do about it. Nothing but wait and wait, and to be as cheerful as I could.

I was with him when he collapsed. I sat beside him day and night until he died. He was without pain—I saw to that, but he died calling out for his son, and I, sitting beside him, could not tell him that he cried out for that which he had.

And so he died, and I wept at his passing.

I buried him and sent the letter with the enclosed money

as I knew I should. Almost, I was tempted to wait and see myself, but sense came in time and I did not. There can be no paradoxes in time. If we had met I should have remembered it. We had not, and so must not, but now many things were clear to me as they would be to him when, in sixty-one years' time, he, too, would sit beside the body of his dead father.

So I left the area and hid myself in the heart of the city, there to do what I could with the rest of my life.

Sometimes, as I sit in my little room, I wonder if I did right. It is a passing doubt. In sixty years' time Vendaris will have perfected his serum and all would live for ever. But I am eighty-seven years of age, an old man, and I cannot possibly live another sixty years. I shall die. My return has cost me immortality, as I knew it would, but it doesn't matter.

I had been with my father when he died.



The Zeiss Planetarium offers—

★ SKIES UNLIMITED ★

MEN HAVE ALWAYS BEEN interested in the stars. They have made models to try and understand the apparent motions of the Sun, Moon and planets. For centuries they have tried to capture the illusion of the eternal skies with their celestial globes, armillary spheres and orreries, but it has only been during the course of this century that universes have literally been available to order.

Now, any university, museum, observatory or private individual can install a machine which will show the entire firmament—past, present and future—to an audience comfortably seated in luxurious chairs.

This machine is, of course, a planetarium.

Many people think of a planetarium as a building or as the room in which the machine is housed but, in actual fact, a planetarium is the machine itself. It is a projector, a combination of optical, mechanical and electrical equipment which may, with justification, be described

as the world's most complex optical instrument and one that is exceeded in cost only by the great 100 and 200-inch telescopes.

Despite its complexity, the function of a modern planetarium can be reduced to simple terms. Basically, it consists of a hemispherical dark room representing the vault of the heavens, on which can be thrown, by optical projection, images of the Sun, Moon, planets, the so-called "fixed" stars and all other heavenly bodies and phenomena, their synchronised relative movements being reproduced and controlled mechanically from a central switchboard.

The concept of the planetarium is not new. More than two and a half thousand years ago the Ancient Greeks constructed celestial globes. Such globes represented the skies as a sphere with the constellations, or the legendary figures representing the constellations, marked on the surface. Made of various materials such as stone, precious metals, bronze, brass, ivory, wood, glass, and

the more recent plastics, such globes have never gone utterly out of favour.

Following the celestial globe is the armillary sphere, first described by Ptolemy in the second century A.D., and used to demonstrate the apparent movements of the heavenly bodies. It consisted of the principal circles of the celestial globe; the equator, ecliptic, colures, etc., the remainder of the surface being cut away. In appearance, it resembled a series of intersecting metal rings, and sometimes models of the Earth, Sun, etc., were incorporated in the miniature universe.

Some time between 1704 and 1709 George Graham, in company with the famous clockmaker, Tompion, designed and constructed an instrument which showed the diurnal and annual motion of the Sun, Moon and Earth. John Rowley made several copies of this instrument, embodying certain improvements of his own, and presented one of them to his patron, the Earl of Orrery, about 1712. Later, Sir Richard Steel, believing this instrument to be Rowley's own invention, ascribed it to him and called it an orrery, a name which it has retained

ever since. This actual instrument, like the Graham one, is still in existence, in the possession of the Earl of Cork and Orrery, who recently placed it on permanent loan in the Science Museum, South Kensington. It is two feet six inches in diameter and about one foot high. Above the decorated wooden drum are twelve gilt pillars supporting the ecliptic rings.

In 1913, when plans for the rebuilding of the Munich Museum were under consideration, provision was made in the astronomy section for instruments which would enable a large number of people to view astronomical phenomena. A highly complicated model of the heavens was built on the Copernican system and was, in effect, a giant orrery. Great as was the success of the installation, yet it failed to produce a satisfactory illusion. It was impossible for the observer to forget that he was standing within a complicated mechanical model and that the relative distances were quite at variance with nature. This led Dr. Oskar von Miller, the director of the Munich Museum, to propose the preparation of a model that would show the heavens as they appear from

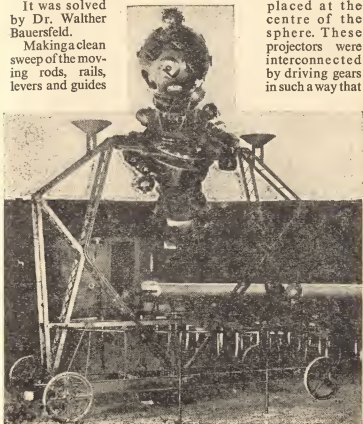
the Earth at night, with arrangements to move the planets in accordance with their apparent motion. It was an ambitious scheme and, as a problem, was far from easy to solve.

It was solved by Dr. Walther Bauersfeld.

Making a clean sweep of the moving rods, rails, levers and guides

of the elaborations of the orreries, he conceived an optical solution. He designed a fixed hemisphere, its inner white surface to serve as the receiving screen for a multiplicity of small projectors

placed at the centre of the sphere. These projectors were interconnected by driving gears in such a way that



the images of the heavenly bodies thrown on the screen represented the stars as visible to the naked eye, in position and motion as would be seen in a natural sky.

With this concept, the modern planetarium was born.

In 1919, Dr. Bauersfeld began to design the first projection planetarium. Five years of intensive work were necessary before the concept emerged as a reality, and its performance exceeded all expectations. Erected upon a roof of the Zeiss works, the first projection planetarium attracted immediate attention, and during the period August, 1924, to January, 1926, some 80,000 persons viewed the artificial heavens. The instrument was so successful that it was immediately revised to extend its capabilities, and so the famous Zeiss Planetarium came into being.

In shape, a modern planetarium is a little like a dumb-bell, some twelve feet long, ringed and dotted with various attachments, the whole mounted on a travelling framework. At each end are the main star globes, about 29 inches in diameter and each carrying sixteen projectors. Each star globe carries special projectors for the

variable stars and for special nebulae and globular clusters. Between the main star globes are the cages, upper and lower, carrying the projectors for the seven, naked-eye objects of the solar system, the Sun, Moon, etc. At the extreme end of each star globe are mounted small globes which, between them, carry 30 projectors for the constellation names.

To represent a star by a projected circular patch of light requires a relatively simple optical layout. To realistically portray some 9,000 stars, all correctly graded and orientated on the surface of a sphere, is something else again. To obtain the desired effect, copper foils perforated with holes of 65 different sizes are used. These perforations are extremely minute, as little as one ten-thousandth of an inch in diameter, and due allowance has to be made for optical and geometrical distortion.

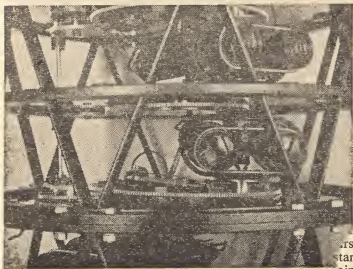
Illumination for the stars is provided by a 1,000-watt lamp with special filaments, differences in the magnitude of actual stars being simulated by adjusting the sizes of the projected images. Images of the brighter stars may have a diameter of fully two inches,

but, owing to the distance of the observer from the screen, these discs are not objectionable. The stars of the lowest magnitudes may have images of as little as one sixteenth of an inch diameter. A gravity-controlled occulting device, mounted in front of each projector, gradually reduces the light as the lens approaches the horizon and simulates the effects of increasing atmospheric absorption.

The Milky Way is projected by two drum-type projectors, one at each side of each star globe. This feature of the

night sky is non-uniform both in width and brightness, yet its presentation in the planetarium is most realistic. A drawing was first made by stippling a negative. This negative was then photographed on a curved film. Occulting for the part of the Milky Way beneath the horizon is done by half-filling each cylinder carrying the film with mercury.

Further sets of projectors give reference either to the celestial equator—declination and right ascension—or to the ecliptic—celestial latitude and



PROJECTOR CAGE FOR MARS AND JUPITER

s
arse
stars
oint



THREE OF THE SIXTEEN CONDENSER LENSES IN EACH STAR GLOBE

longitude. With these projector arrays it is possible to demonstrate effects due to change of latitude, diurnal motion and precession of the equinoxes. During a demonstration, of course, these appearances can take place in a few minutes—the great precessional cycle of 25,800 years, for example, can take place in the planetarium in just over a minute.

From the above it can be seen that a planetarium is far from the glorified magic lantern which some people imagine it. Each instrument contains almost six miles of

wiring and thousands of parts, each fitted with meticulous accuracy. These parts are far from being delicate. This can be proved by the fact that, in the early days of the Zeiss Planetariums, it was the pleasant custom during the Christmas season at the Hayden and other planetariums, to run back the annual motion for almost two thousand years so as to show the appearance of the sky at the time of the birth of Christ.

This was an amazing demonstration of the versatility of the projector, for the run was made at a speed of



one year in seven seconds. This meant that the bulky Moon projector whipped around in about half a second, or over 25,000 times in the trip backwards through time which actually consumed about four hours of continual operation.

The design of a planetarium dome of some 80 feet in diameter involves problems in optics, acoustics and ventilation. If the dome is of painted steel or aluminium the surface is perforated with small holes to prevent echoes. As these holes are so small they do not interfere with the projected star images. The silhouette of

the local horizon is a cut-out at the base of the dome. The light passes beyond the dome to strike an inclined black screen and the illusion is complete.

In a planetarium the artificial firmament shines out with unusual brilliance. The sky appears blue-black and gives the impression of infinite space. The image of Mars is red, Jupiter appears with belts and Saturn with rings. Mercury and Venus are clearly distinguishable. It is most interesting to see the stars by day, to follow the course of the Sun among the stars and to see at any desired point

its position with respect to the equinoxes and celestial equator.

The illusion produced in a Zeiss Planetarium is without parallel. Dr. Phillip Fox, first director of the Adler Planetarium, Chicago, wrote that: "Visitors come to see a stirring spectacle, the heavens brought within the confines of museum walls. Not a trivial plaything, a mimic aping firmament, but the heavens portrayed in great dignity and splendour, dynamic, inspiring, in a way that dispels all mystery but retains the majesty."

Professor C. A. Chant, of the University of Toronto, writes that the semblance of reality "affects the trained astronomer among the audi-

ence equally with the layman. There is no way of describing the experience. It is possible to describe the instrument and what it can do, but nothing short of seeing can convey any adequate idea of the performance."

Are they right?

At the moment the nearest planetarium to the United Kingdom is in Paris, but this unhappy state of affairs is, fortunately, due to be remedied. A Zeiss Planetarium is now under construction for installation in London and so, very soon now, we shall be able to sit in comfort and enjoy the breathtaking spectacle of our own artificial universe.



Photographs by courtesy of Mr. A. H. Degenhardt, London representative of Messrs. Carl Zeiss.

Sleep, sweet sleep, to knit
the ravelled——

Sleeve of Care

BY KEN WAINWRIGHT

THE WOMAN WAS SMALL, withered, faintly ridiculous in her odd assortment of dress and accessories. Mousey hair straggled from beneath a hat which had been new the last fashion but one. A shapeless coat was belted around a shapeless figure and thick stockings tried their best with hopeless legs. She stared at a thick, old-fashioned wedding ring and twisted it with nervous fingers.

"I want to find my husband," she said. "I want you to find him."

Sam Henricks sighed. There was no money here, no excitement, not even the possibility of a satisfied client recommending him to others. A waste of time.

"Have you tried the police?" he said, and managed to keep the impatience from

his voice. He smiled. "Private investigators cost money; the police will work for free."

The woman did not smile. "I have money," she said. "A little. I want you to find my husband."

"I see." Sam pulled a scratch pad towards him and toyed with a pencil. He waited while the woman rummaged in her purse and produced a thin billfold. She opened it and took out a thin sheaf of bills. Sam could almost smell the odour of camphor as she waved them before him.

"I haven't much," she said uncertainly. "I'm not rich . . . but it's all I have."

Sam counted the bills with an experienced eye, mentally shrugging as he assessed the amount. The woman was a fool. She had probably scraped the bottom of her financial

barrel to pay for something which the police, the Salvation Army, the Church, would have done for nothing. For a moment he was tempted to refuse to handle the case, then remembered his rent, his bills, and the state of his bank account. He shrugged again, physically this time, and reached out for the money.

"I think it will do. Now, if you will let me have some details, please." He poised the pencil. "Name?"

"Jud Everet Johnson." Like her clothes, her voice was colourless, whispering from between bloodless lips, giving him the information which made a man.

Fifty-six years of age. Five feet nine inches tall. Ten stone five pounds in weight. Wears thick, horn-rimmed spectacles. Stoop shouldered. Grey hair, thin on top and cropped back and sides. Never wore a hat. Dressed in blue serge, rather worn and a little shiny. Black shoes, blue shirt, red and blue tie. Cheap metal

wrist watch. No rings. Worked as a clerk and had been with the same firm twenty years. No children. No hobbies, Nothing.

Sam jotted down the framework, stared at the thin lined face on a photograph the woman gave him, and tried to clothe the naked bones with warm, breathing flesh.

"No hobbies?" He stared at the woman. "Do you mean that literally?"

He read the classics, the cheap layman's translations. He played cards sometimes, whist, rummy, a little cribbage. He had once kept goldfish and used to own a motor cycle. No hobbies.

"Friends?"

None which she didn't know about. A few people from the office, a couple of neighbours, a few men and women acquaintances at the whist drive. No friends.

"Women friends?"

Impossible!

"Money?"

None. A joint savings account with her as the financial manager doling out a strict budget for newspapers, cigarettes, lunches and fares. No money.

And yet the man had disappeared.

Sam thinned his lips as he stared down at his notes. An ageing, apparently normal man. One of millions. Colourless, insignificant, in fair health and mental stability, had left for work as he had done a thousand times before. Had walked from his neat, mortgaged, semi-detached house in a respectable suburb—and vanished.

And his wife wanted him back.

He stared at her, lounging back in his chair and studying her with impersonal eyes. Young once, obviously. Attractive once, perhaps. No children. No personality. A woman for whom a man had turned himself into a workhorse. Going to work, coming home, going to work, coming home, forcing himself into a

mould, a rigid routine, a complete negation of all he had ever wanted or hoped to be. For how long?

"We've been married for thirty years," she said with quiet pride. "Jud was a little wild when I first met him, but he settled down well and turned out to be a good husband." She dabbed at her washed-out eyes. "I can't understand what could have happened to him."

"Perhaps..." Sam hesitated, knowing how ridiculous the question would seem to her. "Perhaps your husband wanted to disappear? I . . ."

"Nonsense!" Anger glowed for a moment in her faded eyes. "We were happy, with a nice home and a steady job. Why should he want to run away and leave it all behind?"

A hundred reasons, Sam thought grimly. A younger woman, perhaps, or one not so eager to obey the conventions. Vibrant flesh and a transitory youth again, instead of the cold, regulated dispensation of frigid favours.

Perhaps a glimpse of what he had become and a recoiling from it. Perhaps anything.

"I'll contact you when I have investigated," he said formally. "I have all the details, I think. Your address, the address of your husband's place of business. Savings account, friends, background, personal history." He rose and held out his hand. "Don't worry, madam. I'll find him."

She smiled at that, a twisting of her lips and a gleam of something, not humour, in her eyes. Primly, she gathered up her handbag, adjusted her coat, nodded, and left the office.

Sam wished that he could get the taste of her from his mouth.

It was routine, of course; it always was. First to the missing persons bureau, where he did for money what she could have done free—and found that she had already done it. To a big, tired, cynical sergeant with numerous files and a wide-flung web

of contacts. A man who had spent most of his life looking for an answer—and still not finding it.

"Jud Everet Johnson?" The sergeant nodded as he riffled through the pages of his ledger. "I remember, now. A missing husband case." He squinted down at his book. "Gone ten days now." He stared at Sam. "What's your interest?"

"I've been asked to find him."

"So you think you can succeed where we fail?"

"No." Sam found cigarettes and passed one to the big man. Blue smoke rose between them like incense to the Gods of routine and the inexplicable. He smiled. "You know how it is. The woman is impatient, can't even begin to guess why it happened to her. Wants her husband back again so she can restore her nice, quiet, orderly world to untarnished respectability. You know how it is."

"I know." The sergeant dragged at his cigarette.

"You find anything?"

"Plenty." The sergeant reached towards a file. "He isn't dead, or if he is we haven't found him. He isn't a hospital case, either physical or mental, and he wasn't in an accident. He hasn't been arrested and he isn't wanted for any crime." The big man shrugged. "There isn't any law which says that a man must live with his wife. That comes after she gets a court order for maintenance and he refuses to pay—and he can always get out by paying."

"What with?" Sam flicked ash from his cigarette. "Did he have private money? A secret woman who might be keeping him?"

"Not that we know."

"So he just vanished without any obvious reason?"

"That's about it." The sergeant sighed as he replaced the file. "It happens all the time. We'll find him."

"Are you sure about that?"

"The percentages are sure. More than a thousand people disappear every week. They

just vanish—or try to. Most of them we trace pretty soon. Some are suffering from amnesia, others are running from their responsibilities, most just can't take it. Something snaps and off they go." He shrugged. "A few take the trouble to plan their disappearance; we know what's happened to them, even though we don't know where they are."

"But this case wasn't like that," protested Sam. "Jud didn't sneak out a few clothes, hide a little money, have friends his wife didn't know about." He remembered the woman and shuddered. "I'll bet he couldn't cross the road without her knowing when and why. They weren't a couple, they were one unit, and she was the boss."

"All the more reason for his going."

"Perhaps, and yet a man like that wouldn't know the first thing about it. He'd try to be clever, and give himself away. No. If you ask me, this is another one of those mys-

teries. You know what I mean?"

"Who better?" The sergeant stared at his ranked files. "We find most of them. Sometimes it takes years, but we find them. Some we never find. Some just—vanish. No reason. Nothing. They just disappear."

"Like the man who walked around the horses?" Sam nodded. "I'll keep in touch," he promised. "No objections?"

"Why should there be?" The sergeant shrugged. "You've got to eat." He didn't ask why, but his expression did, the inevitable contempt of the professional for the amateur, the skilled man for the bungler. Sam didn't let it annoy him.

Tramping then. Walking from door to door, from office to office, asking, questioning, smiling and polite. Clothing a skeleton with flesh, filling in the gaps, searching for the one thing which could have made a humdrum clod kick over the traces and cut free

from the habit pattern of thirty years.

A cafe, a waitress who remembered, and a fact.

"Mr. Johnson?" She frowned at the photograph. "Yes, I remember him. A quiet man, never tipped, but always patient. Favourite food? Well, he nearly always had cheese on toast or spaghetti. Newspaper? *The Tribune* I think and two cups of coffee, one with and one after his meal."

Fact: Liked cheese and spaghetti. Two cups of coffee and read *The Tribune*.

The office with furtive-eyed men and simpering girls. A man who remembered, another fact.

"Jud? Hell, yes, I know him. Quiet type. Never one for a drink. Used to have a sly bet sometimes. I used to put it on for him. Win? Sometimes, but not often, just about enough to stay even. Women? Not that I know of. Conversation? Nothing special. Home and garden,

wife and work. A dull type. No guts."

Fact: Gambled a little, cautious, timid, conventional.

From the office to the library, where a mannish woman stared at the photograph, flipped a stack of cards, and frowned at the list of book borrowings.

"Pretty much of a pattern. You can tell a lot from what a man reads, you know. Moore and Plato, Homer and Wells, Sabatini and Clarke. Kinsey? Certainly not! Mr. Johnson wasn't that kind of a man."

Fact: Intelligent—at least in his public literature. His private?

The postman shook his head.

"Few letters. Nothing in plain seal. No magazines, parcels or foreign mailings. Photographs? Not that I know of."

Fact: Little outside contact.

And so on. Talks with curious neighbours who licked mental lips as they scented scandal. Talks with the local doctor, the police, the man who sold newspapers and the

one who sold cigarettes. Talks with the people who served behind counters, kept bar, punched tickets. A row of faces, each with masked eyes and guarded tongue. Dozens of them.

And at the end?

Nothing.

Sam grunted as he unlocked the door of the small house he had so far managed to keep from the jaws of his creditors. Tiredly, he eased himself inside and sighed with relief as he slipped the shoes from his aching feet. Madge called to him from the kitchen where she hummed as she worked with iron and heaps of freshly laundered clothing.

"Sam?"

"Yes, dear?"

"Hungry?"

"No. I ate out." He relaxed against the worn upholstery. "Where's Tony?"

"Playing in the garden."

Madge wiped her hands as she came into the living room. "You're late today."

"A case." He didn't explain

or tell her what; and she didn't ask.

"Coffee?"

"Please." A mirror hung over the mantelpiece and he stared at his own reflection as he sipped the coffee, grateful for its warm sweetness. Grimly he stared back at himself, a brown-haired, brown-eyed man, no longer young, and yet not old. Lines of worry searing once smooth cheeks, more lines creasing his forehead, the corners of his eyes, accentuating the bitterness of his mouth.

A tired face. A disillusioned face. The face of a man who had seen too much and done too little about it. An ordinary face. The face of a man about to vanish?

Sam sighed and set down his empty cup.

Tony came in then, vibrant and eager with the wonderful health of youth, his voice high and shrill with the tones of childhood.

"Dad!"

"Yes, son?"

"Freddie Blake's got two

new fish, and can I have some more, tomorrow, please?"

"More fish?" Sam forced himself to be patient. "You can only put so many in the tank, you know. If you overcrowd them they'll die."

"Gosh, Dad." Tony ran over to the small aquarium, bright with its lights and tropical fish, standing in the corner of the room. He stared at it, his brown eyes following the languid, lazy motions of the angels and mollies, the swordtails and zebras, the slow and stately snails and the wriggling tuberfix worms. "Dad!"

"Yes, son?"

"Something's wrong, Dad. Look!"

Reluctantly, Sam heaved himself upright from the chair and joined his son. Together, they stared at the miniature, aquaceous world behind the glass. "What is it, Tony?"

"That fish, dad. See?" A little finger touched the glass. "It's not moving."

"Perhaps it's just resting?"

"It was like it this morning,

and, it doesn't seem to have moved all day," Tony stared worriedly at his father. "Is it dead?"

"I don't think so." Sam lifted the lid of the aquarium and picking up a slender planting stick from a shelf, prodded gently at the fish. Startled, it moved with a flurry of fins, its mouth opening and closing as if scolding them for disturbing its rest, then settled down to the gravel bottom.

"It still isn't moving, Dad, not like the others. Could it be ill?"

"We'll see tomorrow, Tony."

"But suppose it's ill, Dad?"

"Then we'll have to take it out of the tank."

"Suppose it died?"

"We'll have to take it out before it affects the other fish."

"Shouldn't we take it out now, Dad? Suppose it died in the night."

"We'll leave it for tonight. If it isn't moving as it should in the morning we'll take it out

then." Sam smiled down at his son. "We don't want it hurting the others, do we?"

"No, Dad." Tony turned and immediately forgot the problem of the sluggish fish. "Tell me a story."

"Not tonight, son." Sam tried not to feel guilt at his refusal, and Madge, sensing his weariness, moved purposefully towards their son.

"Daddy's tired tonight, Tony. Some other time."

"Gosh, mum!"

"Now, now, Tony! And just look at that time! Bed now."

"Must I?"

"Yes. It's late and you'll be too tired for school tomorrow. Hurry now."

"All right, then."

Silence and the bumping of a small body as it ran upstairs and donned pyjamas. Then a shining little face and a mop of tousled hair, a small body vibrant with life and freedom from care. Lips raised for a goodnight kiss.

". . . 'night, Dad."

"Goodnight, son. Sleep well."

Sam sighed as he watched his wife escort their son from the room and upstairs to his bed. Soon the little mind would be at rest; the deep, peaceful, utterly absorbing sleep of healthy youth would enfold the boy and he would awake tomorrow full of adventure and bright illusion.

Sam almost envied his son.

Madge came down after a while and sat beside him, not speaking, not doing anything, but fill a gap with her body and presence. For a while they sat there, each busy with their own thoughts; then, rising, she made coffee and handed him a steaming cup.

"Hard day, Sam?"

"Routine." He spooned sugar and sipped at the scalding brew. "Missing husband case."

"The usual?"

"Not this time." He pulled a sour face. "No secret vices, no hidden women friends, no sticky fingers. Just a man walking out into the great wide world and dodging out of sight. Completely. Just as if

he'd dug a hole and pulled the edges in after him." He shook his head. "It's weird."

"Perhaps he lost his memory?" Madge leaned across and took his empty cup. "An accident, amnesia, anything? You'll find him."

"Perhaps."

"Yes you will. You're a good detective."

"Am I?" he shrugged. "I can shadow a cheating wife or playboy husband, and I'm good at taking photographs through bedroom windows. I can even check a set of books and put a finger on the office boy who's been helping himself to the stamp money. Sometimes I'm lucky and can even find a man who doesn't really give a damn whether he's found or not. But this case has me beat."

"Why, Sam?"

"It doesn't make sense, that's why." Irritably, he lit a cigarette, dragging deep at the smoke and letting it plume in twin streams through his nostrils. "Look at it. A man vanishes. Just like that.

Just leaves home for work and never gets there. Why? Damn it, why?"

"There must be some reason."

"Is there?" Sam scowled at the smouldering tip of his cigarette. "I wish I knew what it was then. I've checked with the police and they know nothing of him. That rules out accident, amnesia, mental breakdown and fear of discovery for embezzlement. For thirty years Jud Johnson has lived like a machine, and up to ten days ago there was no reason to suspect that he wouldn't end his life the same way." The end of his cigarette sent sparks showering from the edge of the fireplace as he flipped it towards the cold grate.

"I've checked every lead I can think of. I've fitted in the gaps and built up what the man was like—and still it doesn't make sense."

"You're trying too hard," said Madge quietly. "How can you hope to know him after a day?"

"I know my trade, Madge." Sam fumbled for a fresh cigarette, knowing that he was smoking too much and feeling too tired to worry about it. "Give me a swindler or a man with secrets, and I can spot them and track them down. There's a pattern, a sort of cause-and-effect about it, but Jud doesn't fit in at all." He snapped his lighter, swore when it didn't work, and took the match Madge silently offered.

"A man who has been ground down by a possessive wife. A man who still can find it within himself to dream. His reading proves that. Sheer escapism, the Utopias of Moore and Plato, the swashbuckling of Sabatini, the heroics of Homer, the future worlds of Wells and Clarke. He must have lived in a private hell, and yet probably thought that his life was normal and so didn't dream of doing anything about it. A man who took no chances, gambled because he thought it would make him

popular at work, ate cheap food and read a conservative newspaper. A carbon copy of ten million others. The so-called backbone of respectability. The clods who make this world what it is, instead of what it could be. And then he vanishes—and no one knows why."

"But surely you've just explained why," Madge said. "Ground down, dreaming, perhaps the books he read just showed him what he was missing and . . ." She made a gesture with her hands. "He just kept on walking."

"Like Felix?" Sam shook his head. "I traced him from his home to where he bought a paper. Then to where he collected his daily ration of cigarettes. Those people remembered him; he'd been dealing with them for years. The ticket collector couldn't remember whether or not Jud had passed him, and we know that he never reached his office."

"So he decided not to go to work after he'd bought his

paper." Madge shrugged. "He'll turn up again. Men like that always do."

"No," said Sam slowly. "I don't think that he will turn up. I don't think anyone will ever see Mr. Jud Johnson again."

He stared at his wife.

"There's something fishy about missing people," he said. "I don't mean those who just run out, or those who break down, or just have a gutful of routine and try to do something about it. Those people are explicable. We know what they do and why they do it. But there are others. Every week men and women disappear. All over the world, in every civilised country, and some of those people are never found again."

"You mean that they just vanish?" Madge frowned. "But the police could find them . . . couldn't they?"

"No. The police can't find them. No one can find them." Sam spilled ash onto the carpet. "It's one of those things. They just go. Poof!

like that. Without rhyme or reason. Hundreds of them every year."

"But their papers, their employment cards?" Madge showed her bewilderment. "They just can't *disappear!*"

"They do."

"But why?"

"Why?" Sam shrugged. "You're using the wrong word, honey. What's troubling me, is *how?*"

Silently he led the way up to bed.

The next morning he rose early, and before Tony could come down, had inspected the aquarium and decided to eliminate the sluggish fish. He did it with cold mercy, knowing that it would upset the boy to see it lying dead, and knowing, too, that it was more merciful to kill it than to leave it to suffer.

He was wiping his hands when Madge announced that breakfast was ready.

He ate quickly, his mind still tearing at the problem of the missing husband, and

left the house before Tony had left for school. The day was bright, warm with summer and redolent with the scent of growing things. A good day.

The Salvation Army officer was kind, interested, but unable to tell him more than he knew. Sam leaned back in a chair as he gave the basic data.

"As far as I can gather, the missing man is fond of savouries, prefers coffee to tea, likes conservative things, whist, the classics and imaginative literature. The rest you know." He stared at the elderly man. "How long?"

"Before we find him?" The officer shrugged. "How can I tell? We may find him in one of our hostels; such things have often happened. Or he may come to us for guidance. In any case I shall notify our people, but frankly, I can offer little immediate hope. Sometimes it takes years to find a missing person."

"And sometimes you never find them?"

"Yes." The officer stared at Sam. "Sometimes we never find them at all. No one ever finds them." He rose. "I shall send one of our people around to the wife. Poor soul, she will need all the comfort she can get in the bleak days to come. It is not easy to accept the loss of someone who has been the major part of your life."

Sam nodded, a little surprised at the other's immediate thought of the wife, and felt a glow of shame as he remembered his own emotions when he had taken her money. He sighed, shaking hands as if the contact were something strange to him, and stepped from the cool office into the light of the bright sun.

He was finished.

He had done all he could, all he intended to do, and he had done nothing. The isolation of a few habit-patterns. The narrowing down of the moment and place at which the man had vanished. The elimination of any reasonable cause for the disappear-

ance. Negative results. The knowing what Jud had *not* done, and now?

The great question of why and how. Particularly how.

How did a man vanish? Without money, clothes, friends. Without any of the things civilisation regards as necessities. Vanishing as if he had stepped into a swamp, a quicksand, a hole. It is not easy for a man to vanish when a horde of clerks note his every move, his address, his employment. When the police watch every stranger and eyes stare, wedded to questioning brains. Who is he? Where does he come from? What does he do? No. It is not easy to step from life without leaving a trace.

And why?

Why leave everything gained from a lifetime of machine-like work? Sam stood on the street and breathed deeply at the warm air. What would make him leave his home and wife, his possessions and child? A great religious experience? A vision? A sudden

desire to get away from it all? But he had a little money, some clothes, other things, and there was no hurry. He could always go. Tomorrow, the next day, the day after. There was no need for him just to vanish. Not yet.

He stepped from the kerb, his long legs thrusting at the concrete as he strode across the road, weaving expertly between traffic. One step, two; three . . .

And walked into darkness.

And walked into light again.

And stopped.

The street had vanished. The cars, the people, the drone of traffic, and the whisper of pedestrians. All gone. Instead . . .

A smooth floor. A tremendous sheet of blinding light facing him, soaring up from the floor to a fantastic height, brilliant with a cold, blue-white glow. Behind him another wall, tremendous like the first, smaller ones at each side, and above . . .

He looked up, then down,

blinking as his eyes flashed to the retinal after-image of glowing suns and glaring light. Almost he felt his skin prickle to that fierce glow, and as he moved in semi-blindness, his foot struck something on the floor and he stumbled, falling heavily to his knees.

A man snarled at him. A negro, black as coal with red-rimmed eyes and features haggard with brute incomprehension. He was naked, streaked with filth, his skin puckered with fantastic scars, and he rested on a bed of his own making.

Sam gulped and moved away.

It began to register then, and within his skull he felt his mind begin to twist with screaming questions. He had been walking across a crowded street, one moment safe and among familiar things; the next . . .?

Madness?

He knew that it wasn't that. Whatever had happened, he hadn't suddenly gone stark, staring insane. This floor

wasn't the product of delirium. He could feel it hard beneath his feet, and that negro was real, and the walls, and the light. Wherever he was, he was really here, in the flesh, and if he was?

What had happened back on that crowded street?

A car could have hit him, thrown him down and cracked his skull so that things seemed not as they were. Tensely he examined his body, feeling his bones and muscles, then wearily dismissed the suggestion. He was healthy, in a strange place, and so sudden had been the transition that he felt no shock. Only a great wonder and a mounting sense of panic.

Where was he?

In a great room that was obvious. A place of smooth, hard material, with one wall a glowing expanse of light, and the roof a searing brilliance. Grimly, Sam began to walk about the strange place, striding along the lighted wall, letting his fingers run over the smooth surface as he

searched for a crack which would betray the presence of a door.

He didn't find a door, but he found something else.

People. Men and women, all sullen, all tired, all moving sluggishly over the smooth, once-clean floor. A pair of Chinese wandered past, their eyes glazed as if with opium. A swarthy pigmy chattered at him from where he sat on a heap of tubular, cane-like reeds. Three sunken-eyed women staggered past as if drunk, reeling and swaying as they moved begrimed bodies over the floor. A bearded fakir whined at him and a brown islander with hair piled high on his scarred face strode past like a wooden statue.

And one white man.

He sat, head slumped on his chest, still dressed in shiny blue serge, his thin, grey hair rumpled and his eyes, as he stared at Sam, gleamed from behind the lenses of thick, horn-rimmed

spectacles. He was about fifty-six, ten stone five, five feet nine, a clerk, married, very much so, a robot.

Mr. Jud Everet Johnson.

"Hello." Sam sat down beside the elderly man. "I've been looking for you."

"Have you?" Jud spoke as if he had a mouthful of broken glass. He licked grey lips and dragged himself up from the reeds which, like the pigmy, he sat on. "Better get moving," he said dully. "Mustn't sit still too long."

"Why not?" Sam paced beside the stumbling figure of the old man. "What is this place?"

"Don't you know?"

"No. Do you?"

"No."

There was a dull fatigue in Jud's voice. A bleak indifference, a carelessness, a lack of curiosity. Staring at him, Sam felt a quick impatience and shook the thin shoulder beneath its covering of blue serge.

"What's the matter with you, man? Why did you run

away from home? Where are we?"

"I don't know."

"Listen," said Sam tightly. "You've been gone for ten days now. Have you been here all that time?"

"I don't know." Jud licked his lips and staggered, his thin legs collapsing and his thin arms sprawling like the limbs of some crippled spider. Impatiently, Sam stooped over him, dragged him to his feet, sent his palm hard against the grey cheek.

"Answer me, damn you! Where are we?"

"I . . ."

A scream slashed through the thick air. A shriek as of a soul in eternal agony, a rending, heart-stopping sound, and the negro, the man Sam had seen first, bounded to his feet and ran, half-falling, down the room.

"What's the matter with him?" Sam glared at the scarred savage and shook the man at his side. "Jud! What's all this about?"

"Tired," croaked the thin man. "Sleep. Mustn't stop. Keep moving."

"Why?"

"Dangerous. Hurts. Vanish."

He sagged again and Sam swore as he half-carried the thin figure towards a pile of reeds. Impatient or not, the thin man was in no condition to answer and Sam knew that if he wanted a quick answer, he would have to find it somewhere else. Leaving Jud on his heap of reeds, he made a quick examination of the great room.

Five hundred feet long by a hundred wide, and about the same high. All made of smooth, seamless material, hard and slick like glass. On the floor heaped masses of the strange reeds, thick, bamboo-like, spread in wild confusion. No doors. No water faucets. No sanitation—and fifteen people including himself.

Two negroes; two Chinese; four women, mongolian and unattractive; one pygmy; one

fakir; two Islanders; one Eskimo; and the two white Caucasians. Fifteen people of varying race and colour, all but a couple of them moving slowly over the floor, all apparently drunk or doped, all staggering and looking in the last stages of exhaustion.

Sam stared at them, wondering why they were here, then stooped and picked up one of the reeds. The wall of the bamboo-like vegetation was thin and he tore off a piece, finding the interior filled with a pale red pulp. Cautiously, he tasted it, finding it tart and refreshing, with a combination taste of crushed pineapple and peach. The pulp seemed to quench his thirst and he stood, eating the pulp, frowning as he stared around.

Someone shrieked in agonised torment.

It was Jud, and Sam ran towards the staggering figure, steadying him as he was about to fall, and trying to force him to sit down. The elderly man

resisted him with surprising strength, flailing his thin arms and lurching over the floor, his eyes closed and his mouth agape. Watching him, Sam knew what was wrong.

The man was tired. Dog tired. Almost asleep on his feet. Numbed and dull from sheer lack of sleep, and staring at the others he knew that the same thing affected them all. They were tired, that was all, nothing wrong that a good night's sleep couldn't cure. But if they were tired why didn't they sleep? He was still thinking about it when the lights went out.

It was sudden, startling in its abruptness. One moment the wall and roof flared with too-bright brilliance, and the next the room was as dark as the inside of a sealed tomb. With the darkness came a peculiar sound, a sighing, the soft thud of bodies, a snore, and Sam knew that every person in the place but himself had immediately fallen asleep.

He couldn't sleep.

He wasn't tired, and his brain spun with unanswered questions, and he sat in the darkness, staring into the darkness, feeling it all around him like soft black velvet, like a warm hand, silent, pressing, somehow ominous. And within him the panic began to mount with gibbering frenzy.

A sealed room. Men and women, all different, with strange food on the floor. A mysterious something which made them move so that they staggered from utter exhaustion. Darkness. Mystery. A man who had vanished and who was here. Himself, who had not vanished and who was here also.

Vanished!

Sam gulped as he stared into the darkness. Jud had disappeared—and now he was here. Could he have disappeared also?

"Madge!" he groaned. "Tony!"

They would never understand. To them there was no

reason in the entire world why he should walk out on them, and they were right. As right as Mrs. Johnson had been; as a thousand other men and women were, and yet mere rightness did not prevent mysterious disappearances. And yet they mourned those who had walked out on their business and who had never returned. Would never return. Could never return? He groaned in the darkness and one question of relative importance gave way to one of paramount importance.

Why was he here?

He was still thinking about it when the lights flashed on and a scattering of reeds fell with a soggy thud to the floor.

Immediately the people awoke and began to move. Some rested for a while, only to shriek with pain and fear, and stagger to their feet. Jud moaned, sat up, and Sam tore open one of the new-dropped reeds and thrust a mass of the red pulp against the thin man's lips.

"Wake up, Jud. Eat this—and talk."

"Yes." His sleep, short as it had been, had done the man good, and as he stared at Sam his eyes had lost most of their glaze. He swallowed and tried to smile.

"My name is . . ."

"I know your name," Sam interrupted. "I know all about you. Just answer my questions."

"Yes?"

"Tell me. How did you get here?"

"I don't know." Johnson frowned as he ate the red pulp. "I'd just bought my paper, *The Tribune*, you know, and was crossing the street when, all of a sudden, I was in here."

"I see. That was ten days ago then, maybe eleven now." He looked at the man, remembering his choice of reading material, and fighting his own impatience to drag the information out of the elderly clerk. "What do you know about this place?"

"Nothing."

“What?”

“You asked me what I know,” reminded the other. “I don’t know anything.”

“But you’ve been here ten days. You must know.”

“I don’t.” Johnson gestured around him. “When I came here I thought something must be wrong, my head perhaps, overwork . . .” He let his voice trail into silence and rose to his feet. “We’d better move about.”

“Why?”

“If you don’t keep moving you get—hurt. If you still don’t move you—vanish.”

“Vanish?”

“Yes. There was a man here before you, a white man, a professor, I think. He was very tired and he wouldn’t keep moving. He just vanished.” Johnson stared about him with heavy eyes. “It’s happened before, I think.”

“If you’re tired why don’t you sleep?”

“We can’t. The other man told me that the only time you could sleep was when the lights went out.”

“And how often does that happen?”

“I don’t know; it’s only happened once since I’ve been here.”

Once in ten days! Sam swallowed as he began to grasp the picture. A sealed room with an assortment of races. Food falling from the roof. Lights which almost never went out. A strange force which made you move—or else. He grabbed at Johnson’s shoulder.

“What is this? Where are we?”

“I don’t know.”

“But you can guess, can’t you? Damn it, man. Tell me what you think.”

“I read a book once,” said Johnson slowly. “A strange book. It was written by a man named Charles Fort.”

“I know who you mean,” snapped Sam. “Well?”

“He had some interesting theories.” Johnson almost blushed. “I don’t say that I believe them for one moment,

but they were interesting, very."

"We are property." Sam nodded. "I've heard of the book. Well?"

"That was his theory. What you have just said. Fort reckoned that there might be other races watching us, perhaps even owning us. I've wondered . . ."

"Hogwash!" Sam said, and hoped that he was right. "How would that explain this?" He gestured around the room. "Are you trying to tell me that these mysterious 'other races' are scooping us up in the twinkling of an eye and are dumping us in this place like . . . like . . ." He swallowed and sat down on a heap of reeds.

He knew what they were like.

He had known it all along, but perspective and an altered viewpoint had hidden what must be the truth. He stared at the others again. Black, white, yellow. Smooth and scarred, short-haired and

long, big and small. A collection of divergent humanity.

A collection.

It would explain the room, the lights, the food. It would explain all the inexplicable disappearances, the senseless vanishings of staid and normal people, disappearing without trace, without rhyme or reason. It would explain too damn much.

He frowned, sitting on the heap of reeds, his mind busy with fantasy. A Mayfly was born, lived and died within a single day. To a Mayfly a day was a lifetime. To a Mayfly a man must seem to move awfully slowly. Other races, other time rates of metabolism. A day to them might be a long time, or a short time, depending on the viewpoint. A long time and men would appear to move slowly; a short time and men would seem to rush about with fantastic speed. Or perhaps the entire set-up was different. A long day and a short night. A ten-day period of light and a one-day period of darkness.

Normal to them, but abnormal to men who needed to sleep a third of their time.

Sam felt sick.

He remembered his home and his boy and what they kept.

That fish looks ill, dad.

Were men 'fish'?

That one isn't moving, could it be ill?

A planting stick, a sudden flurry of motion, a soundless gasping of protest.

Better have that one out; it may spoil the rest.

A wriggling little body, wide eyes, a gaping mouth, a coldly merciful ending to what had appeared suffering. A taking from the tank, a vanishing? *Had that fish been tired or merely asleep?*

Pain slashed at him, a nerve-wrenching, mind-twisting stab of pure agony, and with his scream came a muscular reaction which sent him staggering across the floor. Sam gasped, noting that the pain vanished as soon as he moved, and grimly kept on

moving as he wandered about the brightly lit room.

That brightly lit wall, a window through which alien eyes watched the antics of strange creatures with silent amusement? A worried youth wondering why his pets didn't move? A merciful being deciding that extended, and, therefore, abnormal motionlessness was a sign of sickness and death?

Sam didn't know.

He didn't want to think about it, but, as he moved slowly about the room, cursing himself for not sleeping when he'd had the chance, already feeling the strength-sapping fatigue which he knew waited for him, perhaps tomorrow, or the day after, or the day after that, he knew that he couldn't escape.

A collection.

In a tank.

With death waiting for any man or woman who didn't appear healthy.

How long could he manage to stay awake?

ASTEROIDS

by E. C. TUBB

DON'T EVER TALK TO ME about the Asteroids. You know the things I mean, all those little pieces of rock circling the Sun in a rough orbit beyond Mars. Some of them are pretty big, and a few, like Ceres and Eros, even have domes fitted and repair yards for the rocket scooters the miners use to travel about on. But most of them are very small, a few hundred tons of stone and minerals, jagged and splintered, and to all intents and purposes, quite useless.

Well, almost. Some of them have veins of minerals, and a few are really worth-while because of the radioactives buried in them, but the majority are about as valuable as a bucket of sand on Mars, which is worth just a little less than a block of ice at the Arctic. They are so plentiful and valueless that no one owns them, and no one bothers about them until someone has landed and set up a radio marker. Then they can claim the rock as their

property and file a claim in the regular way but, until that happens, the Asteroids are anyone's property.

Which is why I was selling them at Shyller, the second largest city on Mars.

I didn't want to sell them—real estate isn't really my line—but I'd met the owner of the joint and he'd pitched me a hard-luck story which almost touched my heart.

"It's my little girl, Dusty," he said, and took time out to dab his eyes. "I'm all she's got left, and you know how it is."

I didn't, but I was looking for a pitch and, as things were, the Asteroid selling racket seemed as good as any. I looked sympathetic and mentally cut his asking price down by at least a half.

"Mr. Dribble," he said, when I mentioned what I thought was a fair figure, "you are a hard man, sir."

"Mr. Skelton," I said. "You've heard my price. Take it or leave it and, just to remind you, I can open my

own office right next door and undercut you like hell."

"You need a licence to operate," he said, and looked hard at me. "You buy registered claims and sell them for what you can get. I trust that you understand that?"

"You don't have to teach me business ethics," I snapped. "I am an honest man and intend remaining that way. Well? Yes or no?"

"Yes," he said. "For your price in cash and for a quick sale. Here are the assets."

The assets comprised a half dozen assorted claims, not one of them worth the paper they were printed on. The only other thing was a framed certificate of a claim made way back, and I stopped the old man as he was taking it down from the wall.

"Leave it, it's mine."

"Not this one," he said. "This is a genuine claim. I made it myself. A good, big Asteroid, loaded with high-grade radioactives. It's worth a lot more than you're offering for the rest of the business."

"Leave it," I repeated, and riffled a sheaf of credit notes. "Leave it, or it's no deal."

He left it. Maybe his little girl had something to do with it, or maybe it was the sound

of money, I wouldn't know. But I happened to bump into him shortly after, and it turned out that his "little girl" was about twenty-five and would have weighed around ten stone on Earth. She was in proportion and carried herself well, and I learned afterwards that she'd worked at a local burlesque as a stripper. Still, compared to the old man, I suppose she could be classed as a "little girl." Young girl, anyway.

The business mine, I made some drastic alterations. I altered the sign; it was one of those small, discreet things, invisible from a couple of hundred yards away. I paid out half of what I had left and got a sign painter to do me one guaranteed visible for at least a mile. Then I installed a continuous tape-player, fitted to external speakers, and plastered the walls with facsimilies of genuine claims. I also found a printer who would run me off some forms which looked as near to the real thing as he could get away with, and still stay inside the law. I bought a big map of the Asteroid belt, a boxful of coloured pins, a geiger counter, which I fixed so that it registered ten times higher than it should

have done, and I was all set to clean up.

At first business was slow. People kept bothering me with claims which they wanted to sell, and became annoyed when I gave them the cold shoulder. I wasn't interested in buying claims; I wanted to sell Asteroids, the more the better, and I wanted to start selling them fast.

I made my first touch to a youngster who should have had more sense.

He came into the office and stared with awe at the photostat-plastered walls. I busied myself with scribbling notes on a pad, then when I figured that he'd seen enough to make him eager, looked up with a polite, half-bored expression.

There was a good reason for that expression. Selling, no matter what, depends a lot on psychology. In the market place, or its modern equivalent, the Exhibitions, I always wore a cheerful smile, as if I was so pleased at handling the product that I couldn't contain myself. I also used a lot of patter designed solely to make the pitch forget what I was saying and to fill out time for purposes of the demonstration. But here, in a sleek office, redolent of easy

money and success, I could afford to be bored and off-hand. Correction, I couldn't afford not to be. Try and shove a thing like an Asteroid down a customer's throat and he will gag immediately. The trick in selling something like that is to make them want you to sell. Once you can do that the rest comes easy.

"Yes?" I pitched my voice just right and used my best English. "Can I help you?"

"I . . ." He swallowed and sat down in the customer's chair. "I'm looking for a good Asteroid, one with plenty of mineral and radioactives; you know the sort of thing I mean."

I did, indeed. He only wanted what half the Universe was looking for; the other half was looking for those who had already found it, but I nodded as though his request was perfectly reasonable.

"Such an Asteroid will come expensive," I warned. "A claim of such nature is obviously more valuable than an uncharted rock." We dealers in Asteroids called them "rocks" and the charted ones "claims." I was careful not to get the terms mixed up. I was also careful to switch on the recorder beneath my desk so

as to have later evidence if he should ever complain.

"I realise that," he said, and so help me if he didn't blush. "I should explain that I want to strike it rich pretty soon because I want to get married. You can see how it is."

Could I? Mentally, I licked my lips for the killing of my career. Couple the old biological urge to the natural one of getting-rich-quick, and I had a hand-made sucker. I hauled out the files, the half-dozen genuine claims mixed with about fifty others, which looked good, but were there just for the padding. I riffled them and set myself to find out just what he was worth.

It wasn't hard. I mentioned a high price and he looked uncomfortable. I mentioned a low one and he looked relieved. I adjusted the margins until I could tell, to within ten credits, just what he was prepared to spend. Then I settled down to take it from him.

"Here is a nice rock," I said. I walked over to the map and rested my finger on a coloured pin. I didn't worry about which colour. "Number 254/675/89," I said. "A potential source of great wealth for an enterprising man." I wasn't lying, either. It could

have been solid platinum for all I knew. No one had ever been there to find out.

"Is it expensive?"

"Ten thousand credits will cover it." I sounded as casual as I could, but I had guessed right and he nodded.

"It sounds nice. Have you any samples?"

I looked at him sharply, because anyone who talked about samples knew what he was doing. I sighed and shook my head.

"No. But if you want samples I have a specimen from a claim which I think you will agree shows great promise." I hunted through my lower drawer and found some old pieces of rock. Skelton had left them and, up until now, I hadn't given them a thought. I dragged one out and held it before the geiger. It would have chattered anyway, but maybe it was because I held the sample in my left hand, and had a radium-painted dial on my wrist watch, it sounded like a battery of machine-guns letting off at the same time. I dropped the sample back into the drawer and switched off the geiger.

My prospective customer looked suitably impressed.

"Why didn't you show me that before?"

I couldn't answer that honestly because the reason would have sent him out of the office and screaming for the police. Instead I shrugged.

"I'm afraid the price on that particular claim is very high. Twenty thousand credits and I won't take a credit less."

He blinked, and I could see him performing mental arithmetic. While he was thinking about it, my eye fell on the framed claim Skelton had left, and I lifted it from the wall. Why the old man had kept it I didn't know. Naturally, I discounted his wild talk of it being valuable; if it had been he would have cashed in on it long ago, and I guessed that he'd bought it from some drunk for the price of a bed. Looking at it gave me an idea. The claim was genuine and, as far as I knew, must be worthless. If I could give the impression that the sample I had shown the customer belonged to the claim in my hand I might be good for double what I had thought. A quick look at the youngster showed me that he had finished his calculations and had reached some kind of a decision.

"Twenty thousand will just

about clean me out," he said dubiously. "But if the claim is as good as you say it is..."

"I make no claims," I said quickly. "All I can do is to show you the registration and a sample." I smiled at him, man to man, and spoke the simple truth. "I have never seen this particular claim and I refuse to make any statements outside of my personal knowledge. It could be barren rock." My smile grew wider. "On the other hand it could be worth billions. Common logic will tell you that there must be an element of risk because, if I were sure as to its value, then I wouldn't be offering it for sale."

Ridiculous? No. I knew that he wouldn't believe me and, in a case like that, it's far easier and a lot more honest to speak the unvarnished truth. Not that I ever do anything else, you understand, but there are ways of speaking the truth, and there are more ways of leaving the important parts unsaid. I have a great contempt for liars; they betray a pathetic lack of imagination, also, they are the more easily caught.

He bought the claim.

I sighed with relief as I fingered the heap of credit

notes he had left me, and I even went so far as to kiss one for luck. Just one kiss because, just after he had left, a gang of zany tourists, with a yen for easy money and about as much knowledge of the Asteroids as I have of deep-sea diving, entered the office. For the next few hours I was busy selling them brand new pieces of rock no one had ever before sullied with a human foot. I sold them cheap, too, which was considerate of me, considering all the trouble I had gone to in order to give them the exact co-ordinates. It saved them the price of a stellar map, anyway.

Things went pretty smooth after that. I had the usual trouble with the police, and a little more from the other agencies who had the temerity to insinuate that I wasn't operating in an ethical manner. I cured both problems the same way. After all, I had my half-dozen genuine registrations, didn't I?

I did, and I took great care never to have less. I even bought a few to replace those I'd sold, but in the main, my best business was done with wide-eyed hopefuls who were eager for cheap bargains. One thing about that sort of

customer, they're so keen to get something cheap they never stop to ask themselves why it's cheap in the first place. By the end of the first month I'd had to rearrange my coloured pins so as not to sell the same Asteroid twice. Not that it mattered all that much; you can't sell what doesn't belong to you, anyway, but I like to be nice about such matters.

Towards the end of the second month Skelton came back. He looked older than he had before, and there was a hangdog air about him which gave me the impression that his "little girl" had thrown him over after sucking the orange dry. He didn't waste any time.

"That claim, Dusty," he said. "The one in the frame. I want it."

"You can't have it," I said coldly. "You sold it to me, remember?"

"No I didn't," he said, and gave a nasty grin. "I transferred the rest of the claims to you, but not that one. Where is it?"

I didn't answer straight away. I spent some time checking the transfer receipts and felt a cold hand grip my stomach when I found out that he was telling me the

simple truth. It hadn't mattered at the time. I'd only insisted that he leave it for the hell of it, but, if he wanted to get nasty, I was in a spot.

He wanted to get nasty.

I tried to convince him that what he was doing was unethical, unbusinesslike, and dishonest. I even went so far as to threaten to call in the police, but he met that one with information which startled me. Skelton was a shrewd operator, too shrewd for the good of an honest man like me. It seems that the agencies worked in a nice tight little ring in order to keep selling prices up and buying prices down. I hadn't bothered about that; details such as price rings belong to a long-term policy, and I'd had my own ideas. Anyway, Skelton had kept an eye on things and had had his suspicions. The pay-off came when he told me that my last customer had been a paid spy, seeking proof to have me thrown out of business and into jail. And guess who he'd been paid by?

Skelton, the rat!

Even at that I wasn't worried. I'd kept strictly within the letter of the law. I hadn't sold any claim twice; in fact, I'd hardly sold any claims at

all. All I'd really sold was my personal permission to go out and look at the specified Asteroid. That was the part in very small print. The compositor had worn magnifying spectacles to set the type. The rest of my forms contained a lot of double-talk which sounded good, but boiled down to nothing.

Skelton admitted that, as far as that went, I was in the clear, and that was why he was after his claim certificate. Not because he wanted it, but because he wanted money. If I'd have had it I would have given it to him, but I didn't have it. I'd sold it, and that, on Mars, was a criminal offence carrying a ten-year penalty.

And Skelton knew it.

"Look," I said cautiously. "I've mislaid it somewhere. It'll turn up again I'm sure, but, just to keep the books straight, how about me buying it from you for say . . . a hundred credits?"

He cupped his hand to his ear as though he were deaf.

"Five hundred," I said. "And you know very well that it isn't worth half of that."

He made his stupid gesture again and grinned like the fool he had taken me for.

"All right," I surrendered. "A thousand, take it and get the hell out of here."

"You've sold it," he said. "I checked the transfer and I know. I want what you sold it for."

"Impossible!" I felt ill as I thought about it. "For one thing I haven't got that much money, and upkeep of this place is expensive and I had debts to pay." I leaned forward and set to work to sell myself to a man who didn't know what humanity was. I sweated, I pleaded, I even wept real tears, but the least he would take was fifteen thousand. He must have been psychic; that was just about the amount I had in the bank. Naturally, I don't keep all I own in the bank, but what was left in my sock wasn't anywhere near as much.

I had just finished writing out the cheque and was examining his signature of the transfercertificate, back-dated, naturally, when the door opened and a young couple entered the office. At first I didn't recognise the man, but when he spoke I realised that he was the lucky purchaser of the disputed claim. I steeled myself for more trouble.

"Mr. Dribble," he said.

"I want to thank you. Yes, sir. You've been a real gentleman to me, and I'd like you to know how much I appreciate it."

He grabbed my hand and tried to tear my arm off.

"Mavis and me got married yesterday, right after I got back from that claim you sold me." He grinned even wider. "We're rich, Mr. Dribble, and we owe it all to you."

I swallowed. "To me? You mean that the claim was a good one?"

"A bonanza!" He almost glowed as he spoke about it. "At a rough guess I'd say it works out at about ten credits the pound. Thanks again, Mr. Dribble. I'll recommend you to all my friends."

"Thanks," I croaked and managed to smile. I lost the smile as soon as they had left the office.

"Ten credits the pound," whispered Skelton. "That rock was registered at around five hundred tons. Ten million credits! Dusty! I feel ill!"

He looked it, too, but not half as bad as I felt. Ten million credits in the palm of my hand, and I'd thrown it away!

Asteroids!

When men venture into space they must think of everything.

PROJECT AIR

by KENNETH JOHNS

WHEN MANKIND FIRST leaves the atmospheric shell of his planet he will be utterly isolated from all that he needs and takes for granted. He must enclose a small part of his planetary environment in a ship and, like an egg, use it to guard his frail body from the alienness of space.

His physical needs are simple—air, food, water and a moderate temperature; but will it be possible to supply them when his mother planet is millions of miles distant?

The *first* spaceships will be slow, lumbering transports needing months to traverse the reaches of interplanetary space—far different from the slim interstellar cruisers so often pictured.

Just what quantities of supplies will be needed to

keep the spaceman of the future physically fit? How will the prime problem of his air supply be solved?

We take for granted the limitless volume of our planet's atmosphere, forever purified by plants and by the seas. In stark contrast, our spacemen will need an artificially air-conditioned atmosphere that will have to be continuously regenerated. Scientists of today are already deeply engaged in solving this logistic problem of the space age to come.

The atmosphere in the first spaceships will be at only a third of the pressure at the surface of the Earth. The lower pressure will not demand as strong a cabin and will result in smaller losses due to air leaks.

The total air pressure will be

five pounds a square inch (instead of fifteen pounds a square inch on Earth) and will be made of equal volumes of oxygen and nitrogen. Helium will not be used because it leaks too rapidly and it is too good a conductor of heat. There is little possibility of the spacemen developing "the bends" as do deep-sea divers; the air pressure will not be high enough for more than small amounts of nitrogen to dissolve in the blood.

Space doctors—and there is already a Department of Space Medicine in the U.S.A.—have calculated that each spaceman will need an average of two pounds of oxygen a day, comprising two ounces an hour whilst working and a third of that whilst sleeping.

This means that for a short two-man trip into space lasting seven days 28 pounds of oxygen will be needed. A journey to the Moon and back, lasting 10 days, will require 40 pounds of oxygen, whilst an interplanetary orbit (most economical on fuel) to Mars and back, lasting 500 days, will need 2,000 pounds of oxygen for two men.

There are difficulties in the regeneration of oxygen once it has been used, so it must be carried in the ships. For short journeys, lasting only a few days, compressed oxygen gas can be used. But this needs strong cylinders weighing 15 pounds for every two pounds of gas. Thus, the short seven-day trip will need 210 pounds of mass to supply the oxygen for two men.

Sodium peroxide would be more convenient, as it removes carbon dioxide (the waste product exhaled from the body) and replaces it with oxygen. However, only a fifth of the weight of the sodium peroxide is useful oxygen.

Our short, seven-day journey would require 140 pounds of sodium peroxide to regenerate the air.

In theory, liquid oxygen is compact and only needs light containers. But it must be stored at less than -182.9 degrees Centigrade in heat insulated tanks. It would be ideal for short journeys, as the air in the cabin could be passed through a tube in the liquid, condensing out

water vapour and carbon dioxide and boiling off some of the oxygen from the liquid. A seven-day supply would only run to 28 pounds of liquid oxygen—although a safety factor must be included, so that the figure would be nearer 50 pounds.

Liquid oxygen will be used by Moon explorers in spite of the fact that they must re-condense part of the oxygen that evaporates from the tanks. If the ship does not rotate to create an artificial gravity, then the condensing could be done by passing the gas through tubes on the dark side of the hull; otherwise, a massive cooling unit must be carried.

Compressed oxygen gas and sodium peroxide would have far too much mass for the Moon journey and exploration, but the liquid oxygen for a two man crew for 20 days would be 80 pounds. The safety factor would raise this to nearer 150 pounds.

Alternatives include hydrogen peroxide and water.

Hydrogen peroxide easily breaks down to give oxygen

and water. This reaction can be explosive if uncontrolled, adding yet another hazard to an already dangerous undertaking. Water, either from the hydrogen peroxide or carried as a liquid, can be electrolysed to give oxygen and hydrogen. Oxygen makes up 95% of the mass of hydrogen peroxide and 90% of the mass of water. The remaining hydrogen can be bled off into space.

A two-man 500-days expedition to Mars and back would need 2,250 pounds of water to provide the oxygen.

Water would be a useful and practical oxygen carrier, as it is widely found—space-men would be able to replenish their tanks from the snow of the polar regions of Mars, and from the ice of the Asteroid Belt. Even the particles of interstellar dust beyond the orbit of Jupiter are now believed to be mainly ice.

Water is easily transported, and it is inert—an important consideration where so much of the living room furniture is highly explosive. Electricity for the electrolysis could,

near the Sun, be produced by a small solar mirror and turbine, or by the new photo-electric solar batteries. Otherwise a nuclear reactor would provide all the necessary power.

The utilisation of oxygen in breathing gives water vapour and carbon dioxide as the by-products. Normally, the atmosphere of Earth contains only 0.03% of carbon dioxide—0.5% is lethal. The carbon dioxide and the water vapour must be removed.

Chemicals can do the job, but they would take up an enormous amount of otherwise useful mass. The simple answer is a two-stage condensation, using the radiation of heat into space to cool part of the air.

If a wide tube in space is so arranged that it is kept at just above 0° Centigrade, then most of the water vapour will condense out and can be distilled and re-used. This will amount to about four pints a day for each of the crew.

If part of the dry air is then passed through a tube well below -70° C., then most

of the carbon dioxide will condense out as a solid. Using several tubes, one operating whilst another is being cleaned, it will be possible to keep the water vapour and carbon dioxide contents down to breathable limits.

The temperature of the ship will be important, for the hotter it is the greater the amount of water lost by the body by perspiration and breathing. The problem anywhere on the Sun side of the orbit of Mars will be cooling the ship—otherwise the temperature will not only be high enough to be uncomfortable, but will result in the air-conditioning unit being overworked.

In the absence of artificial gravity, the air in the cabins will be stagnant—it will not move unless continuously blown by a fan. A match will not continue to burn, as its products of combustion form a sphere of oxygenless gas and stifle the flame.

The ducts from the air conditioning units must reach to every corner of the cabin, particularly over the bunks.

A continuous draught of air over a sleeping spaceman's face is necessary to prevent him suffocating from lack of oxygen.

For the longer journeys between the planets it may be more efficient to use algæ to regenerate the air. It will be a case of balancing the mass of an algæ culture unit against the weight of oxygen (and food) needed.

Unfortunately, there is no simple way of converting carbon dioxide into oxygen—the molecule is too stable. Contrary to popular belief, even plants cannot completely break it down; all they can do is to remove the carbon dioxide from the air and use it in their tissue. The oxygen they produce comes from the splitting of water molecules; the hydrogen is built into the plant tissue.

So that, even with a fully operating air "plant," water must still be carried by the spaceship, and part of the condensed water vapour used as food for the plants.

The oxygen produced by 300 square feet of plant leaves

is enough to support one spaceman. But the oxygen from a layer of algæ one inch thick, covering 120 square feet, will furnish all the oxygen required by 50 men.

Already, much information is available regarding the single-celled, bright green algæ, *Chlorella*. It is really a tiny plant only a hundredth of a millimetre in diameter. It does not produce roots, flowers or fruit, but grows and multiplies astonishingly quickly, each plant reaching maturity in ten to twelve hours.

Algæ will continuously reproduce under fluorescent lights, and a suspension of them, containing up to a quarter by weight of algæ, can be continuously handled by pumps and forced through pipes. Very convenient under zero gravity conditions.

There is also the serious problem of the build-up of other impurities in the air. We have had very little experience of human beings living in completely closed cabins—even in a submarine, the atmosphere is regularly flushed out with fresh air. Cram a couple of men in a

tiny cabin for several months and the air would literally stink.

In a spaceship these smells will have to be removed before they make life unbearable.

And carbon monoxide (found in the exhaust fumes from a car), chlorine and mercury vapour will build-up in the air, all of them being poisonous. Electric arcs and sparks create dangerous nitrous oxides, whilst even the paint on the walls will continuously give off small quantities of toxic materials. Over thirty poisonous vapours have been listed that may well reach dangerous limits in an entirely enclosed system. They must all be removed.

Practically all of these impurities are absorbed by active charcoal, the material used in gas masks. But in space there is the added advantage that the charcoal can be easily regenerated. If the dry air from the air conditioning unit is passed through a tube containing active charcoal cooled in space, then absorption occurs. If the charcoal is heated and exposed to the

vacuum of space, then the impurities are sucked out and lost. The charcoal can then be re-used.

The carbon monoxide will require separate treatment, the simplest method being to pass the air through a hot catalyst such as finely divided platinum. The catalyst remains unchanged, but the carbon monoxide is oxidised by the oxygen to carbon dioxide, which is removed by the normal methods.

It can be seen that the air conditioning unit will be one of the most complex pieces of mechanism in an interplanetary spaceship. It must be as near foolproof as possible and be semi-automatic. Interlocking air analysers and controls must be able to handle any emergency without overloading any part of the equipment.

In space you cannot run round the corner to the repair man; either you carry as few spares as possible, or you are able to make the parts yourself. Whatever happens, you only make a mistake *once*.

Nuisance Value

BY JOHN BRUNNER

THE PERIOD OF SILENCE which followed the blast-off was unbearable. Foley, managing to keep his face expressionless, flexed and clasped his thin, unusually white fingers, on which a yellow smear of nicotine stood out like a scar, a relic of the cigarettes with which he had sought to ease the tension of the past month. Normally, he stuck to his pipe, but he had scarcely been able to find time to fill it these last few weeks. He had to do *something*.

And that, in a way, was the key to the whole problem.

Four others of the half dozen in the concrete block-house were more fortunate. There was the prematurely grey man in khaki, sitting before a luminous screen, the jacket with the insignia of his major's rank thrown carelessly over the back of his chair. There were the youthful-seeming men in Air Force blue tunics—a wing commander and a flight lieutenant—whose collars bore the crescent moon symbol of the embryo Spatial Branch, and whose eyes flickered from

point to point over the instrument boards before them with something of the irregular fidgetiness of the needles on the telemetering dials they watched. And there was the only non-commissioned member of the group—aside from Foley, of course—the staff sergeant of signals, delicately filtering indefinable static out of the verbal communication circuit. He had to be there. No machine could be constructed subtler than the human ear for distinguishing the minimal information content which was all the storm of solar radiation in free space left of speech.

Of course, there was no speech for him to catch yet, but he kept minutely shifting the resistances under his hands, as if by reflex.

Even Taunton was less badly off, thought Foley greyly. Taunton was merely aware that this had happened three times before, and ended in failure. His function was to tell people what to do—not how to do it. When they failed, he fumed and gave more orders. Of course, he was

aware that he would be officially responsible if the whole project turned out a failure, but that was nothing new enough to worry him. What would be troubling that rigid mind under the casque of clipped brown hair—Foley noted the fact without pity, for there was no need for it to disturb the man—was that someone was sitting calmly less than ten feet away, in the middle of a wall of security tighter than that around the Manhattan Project, who was not under his orders.

Who was not only not under those orders, Foley amended silently, but who took a pretty poor view of them, though so far he had overtly confined his objections to words. Now, though, he and Dolman, his colleague who was waiting on the other side of the world where the ship was scheduled to land, had agreed to go beyond words, and if they were wrong, there would be new kinds of hell to pay . . .

He let the thought die of its own accord and absently fished for his pipe, the tension of the moment suddenly dwindling into insignificance. It came back with renewed force, even as his fingers

touched the smooth plastic of his tobacco pouch, and he froze in astonishment.

Exactly at that instant, the staff sergeant covered the microphone with his hand and said in an urgent tone: "He's switched on, sir. I'm getting the carrier wave."

If he was expecting a stir of excitement, he was disappointed. It had all happened before. He did not know it, of course—he was new. His predecessor had lasted through the three previous attempts, and then had had to be invalidated out of the service. Foley was hardly surprised; if he had been in at the beginning, he could have warned Taunton about it, but it was no use wasting regrets.

However, he would see to it that this man was replaced for the next shot if this one, too, was unsuccessful. Trying to sort the gibberish of chance interference from the gibberish of a lunatic was more of a strain than the mind could easily stand. Foley had played the recordings till he was sick; *he* knew.

Now Taunton nodded sourly. Then, with an attempt at grace, he said: "Put it on the speaker as soon as you get something clearly."

The staff sergeant nodded, his busy hands moving over the mixing controls, striving to impart greater comprehensibility to the incoming noise. Even though it had all happened before, Foley noticed, the others seemed to feel a shadow of the same tremor of sheer excitement he himself felt when he remembered that the voice would first speak to them from a thousand miles above the Earth. Then——

Yes. *Then*. That was the point.

Foley's mind went into high gear all of a sudden, and in the few seconds before the wall speaker boomed, he seemed to review mentally the whole history behind the undertaking.

In the beginning, the task was simple; send a man round the Earth.

It grew less simple when they had to add the corollary: bring him back sane.

The mechanical part of it was easily enough accomplished. Small collections of instruments had made the trip first, burning up in the atmosphere as they fell back, their momentum gone. Then permanent satellites had been hung up on nothing against that spangled black curtain——

rockets with just enough fuel to set them spinning for ever in chance orbits. What orbit did not particularly matter; three hours or nine hours, or six and a half. After that, there were ships which made the round trip—literally—and returned. The machines were virtually perfect by then.

But only with the perfection of machinery. At the start it was enough to send up something to perform the passive function of relaying data. But it was not long before all the necessary information was in and gathered. After that, people wanted to do something in space—and that meant sending out a man.

So the two rival giants who had climbed neck and neck up the ladder to the stars so far, set their feet on the next rung, and it broke. By devious routes the information leaked out—there were few absolute secrets on the planet now. Even before security slipped enough for that to happen, the powers that be on both sides of the world had practically agreed to give it up as a bad job, for the time being at least. When they heard that their opponents had reached the same conclusion, they probed the source of the news cautiously, found it

reliable, and relaxed. In time, the answer to the problem would turn up. Meanwhile, there was no great hurry. It was ridiculous to think that the scientists of the other side, handicapped as they were by (and here each inserted the current catchwords), would beat their own splendid technologists . . .

Some people, however, insist on finding out for themselves. On the strength of a rather ingenious, and so far quite private, application of nuclear energy to rocket propulsion which was hideously expensive and also about six times as reliable as chemical drives, a team without preconceived ideas had sunk their teeth in the problem and found it very tough chewing.

After the three failures which had preceded this fresh shot, it had been doubtful for a while if another would be made. However, the logic was clear. The expensive part of the equipment—the spaceship itself, including nine million pounds' worth of telemetering gear and the *only* proven atomic rocket motor on Earth small enough to lift itself more than fifty feet off the ground—was still in one piece. It had functioned without a flaw. Therefore, the angle to

be attacked was the human one. The pilots must be at fault.

They threw their early, and obvious, decisions out of the window. Because the ship was entirely automatic, they had assumed that an ordinary pilot with some experience of stratosphere flying in pressure suits would do, provided he was free of agoraphobia, because of the size of space, and claustrophobia, because of the size of the pilot's cabin—approximately that of a roomy coffin and of unpleasantly similar shape. There were many kinds of available pilot; there was only one ship, and they had it. Pilots, therefore, were, comparatively speaking, expendable. Of course, it would be nice to get one back with his mind in one piece, since otherwise there wasn't much point in having the ship . . .

Thus reasoning, they sent for Dolman and Foley, who had come up with an answer so ridiculous that no one except the two psychologists themselves, and one other man, knew what it was. That was why Foley was sitting now with his hands aching from the nervous bending and twisting he had given them.

It had better be the right

answer, Foley thought again.

Then the wall speaker filled the room with startling clarity. "Hullo! Hullo, base—can you hear me?"

That was the way it had started before, but to Foley, who had only heard the previous broadcasts through the impersonal medium of a recording, it was gripping. He leaned forward tensely, his eyes turning to focus on the round, blank mouth of the loudspeaker as if he could look up through it and see the man beyond. But Taunton had to make an obvious effort to infuse enthusiasm into his voice as he answered:

"Hullo, Post! This is General Taunton speaking. We can hear you clearly. Are you all right?"

"I'm fine, so far," the booming voice came back—the distance was not yet great enough to cause noticeable time-lag. The staff sergeant grimaced and turned down his high frequency gain.

Not, of course, able to know about that, Post went straight on. "I'm still in the acceleration couch, as I was told. Someone's over-inflated this blasted pad, though—I'm being squashed against the straps." There was a ratchet sound—the noise of

the fastenings being adjusted—and then a deep sigh. "Ah, that's better."

The restraining straps had been all right before. Aside from that, this was an echo of the previous occasions. Up to the end of the first hour, the pilot would be all right. After that, they could only hope. Especially Foley.

So far, there was the same hint of relief at finding himself alive, the same cocky jauntiness, and the same exhilaration that Marlow had displayed. And Reeves. And Sanderson. But in the end they had been whimpering and broken, kicking impotently at the cabin walls and shouting to be taken back to Earth.

"That's fine," said Taunton. "Uh—what are you doing now?"

"Sorry about the straps," put in Foley, glancing side-long at the general. "We'll see someone loses his hide for it."

"Thassokay," said Post, managing to make three words into one. "It didn't bother me much. I'm going to have a whale of a job getting used to this free fall, though. I keep getting the idea that I'm in a lift which has just started to go down very fast. Roll on mealtime—I could do with

something to anchor my stomach down!"

There was a thud by way of interruption, and Taunton broke in, raw nervousness edging his voice: "What's that?"

"Sorry, sir. I hit the wall—kicked it, rather. I'm trying to get out of the couch to start the ship check. Will do as soon as I've found out how to get around the cabin, anyway."

"Switching to relay one," put in the staff sergeant in a carefully controlled whisper. He pushed over two mercury resistances to the limit, and the slight but noticeable change of tone caused by the different channel hummed at them from the speaker. Relay one consisted of two stratosphere planes at sixty-five thousand feet, trying to pace the spaceship as it fled towards the rim of the world. In its six-hour orbit—the shortest time compatible with the production of valid data on survival factors—it would remain in line-of-sight of the racing aircraft for some time before the Pacific shipborne relays cut in.

Foley became aware that Taunton was looking at him meaningly. "Yes?" he said, rousing himself.

"What do you make of that remark about the lift?" said the general in a low tone. "It doesn't seem promising."

"It isn't," said Foley, shrugging. "It's the same as Reeves' description of expansion in all directions, and Marlow's idea about looking down a well with one's eyes shut and seeing it with one's nerves. Post's just a little less imaginative than the others." He added, musingly: "You know, Marlow's was quite a striking image, if you think of it."

Taunton hesitated for a moment, while indeterminate banging noises and an occasional muffled curse filtered through the speaker, bringing a reluctant smile to the lips of the staff sergeant.

"Well, he's all right so far," the flight lieutenant muttered, to no one in particular, and the wing commander shot him a wry glance.

"What do you mean by 'all right'?" he asked pointedly. Taunton's lip curled, and he turned back to Foley.

"You seem very calm," he said, in what was meant to be a biting tone. "What exactly was the special training you gave Post, to make him come through when the others didn't? They were better men, I'm sure."

Foley gave what he hoped was an enigmatic smile. "I'll tell you when he's down in one piece, general," he replied.

"When!" snorted Taunton. "If!"

"Hey!" said the wing commander, suddenly. He tapped the flight lieutenant on the shoulder and pointed to a dial before him. The junior officer's face went white.

"What is it?" demanded Taunton and Foley together, rising and striding across the floor.

"This!" said the wing commander. He indicated the meter labelled: PROPELLANT RESERVE; it was slanting by degrees towards the zero mark, when it should have been rock-still.

"Quickly! Tell him!" said Taunton, as soon as he had recovered from his momentary shock. After all their care and worry about the human element—the pilot—to have a mechanical fault develop!

"Don't worry," said the wing commander, with glacial calm. "He'll spot it for himself in ten seconds."

The ripest curse yet belated from the wall speaker, and Foley nodded. "He's seen it," he said. His face was whiter than anyone's in

the room, and—illogically—his fingers were crossed.

Frantic scrambling movements came from the speaker. They waited helplessly for a second. Then Foley stepped back to the signals desk and snapped into the mike: "Post! What the devil are you doing?"

The voice which came from the wall had lost every trace of its self-assurance, and Foley bit down on his lower lip. The high, petulant and scared tones said: "This meter says the blasted juice is running away!"

"So?" said Foley, managing to infuse a sneer into his voice. "You won't need much to tip you out of that orbit. It can't be dangerous yet——"

"For Chrissake, Foley!" Then Post seemed to be struck by a fresh idea. "It isn't really running away, is it?" he pleaded. "Tell me it's only the meter gone wrong!"

"Yes, of course the juice is running away," Foley said with assumed tiredness. "We've got it on our dials, too."

Taunton laid a hand on his arm, which he shook off impatiently. "I know what I'm doing," he muttered. He bent closer to the mike. "Well, Post? What are you

doing about it?" he rasped.

There was a pause, followed by a sound as if Post was sighing from the very bottom of his lungs, trying to regain control of himself. Some of his self-confidence crept back in his next words.

"What am I doing about it?" he echoed wonderingly.

"Damn it, man, do you expect that crate to nursemaid you? Something can go wrong with any kind of machinery. That's not the end of the world."

Again a pause. This time, when the pilot answered, his voice was shaky, but normal.

"All right. You've got more instruments for this ship than I have. Tell me if you can make out from your board where the leak's likely to be."

Foley glanced across at the wing commander, but the officer had already taken his cue. He didn't bother to consult his instruments before barking his reply.

"Between reserve tanks two and three. There's a pressure-equalising pipe between them with a bleed cock on it. The cock might just possibly have shaken open with vibration."

"Hear that, Post?" Foley demanded.

"Got you," the pilot answered. Helmet-echo tinged

his words. "Okay. I've sealed my suit. I'll have to exhaust the compartment now—oh, just a moment."

There was a rushing hiss of escaping gas, and Taunton demanded: "What was that?"

"Remembered I'd better let the air out of my couch pad," the pilot answered cheerfully. "It was blown up so tight it might have exploded when the pressure dropped." More banging sounds accompanied his explanation. "I'm having to wriggle some. Okay, I'm letting the air out now. If you didn't guess right, I'll wire myself into the speaker circuit with my suit mike to save wasting the emergency air when I go out again. Wish me luck!"

There was a rush of gas again—but this time it dwindled and stopped.

Foley found there was a bead of sweat from his forehead dangling on the tip of his nose. He took out his handkerchief mechanically and wiped it away. Nobody said anything. Occasional faint whines of static that eluded the vigilant N.C.O. and *chunks* as Post struck solid parts of the hull hard enough to jar the sensitive microphone were all that interrupted the silence.

In the end, the major at the

radar screen said his first words since the launching. "He didn't lose enough fuel to disturb his orbit, anyway," he remarked optimistically. "The ship's exactly on course."

"Well, naturally," snapped the wing commander acidly. The major shrugged and returned to watching his screen. It would not be long now before the ship was out of range.

"As if we didn't have enough to worry about," said Taunton softly. "Isn't it enough that the pilot should break down, without the ship failing as well?"

"Post hasn't broken down yet, sir," the wing commander pointed out levelly.

Foley wrenched his gaze away from the dial labelled PROPELLANT RESERVE, which still crept inexorably downwards, after five minutes' intent concentration, and looked about him. The staff sergeant was intently chewing his nails and looking as if he wished himself well out of this. Foley knew that the same picture was filling his mind as well as the others'—a vivid image of Post, clad in his cumbersome suit which had been designed more to keep its occupant alive and comfortable in the narrow

cabin than for moving around, struggling to squeeze his bulk down the narrow gap between the fuel tanks—only they did not hold the kind of fuel that burned. His faceplate would be smeared with the juice as free-floating bubbles drifted from the leak and ruptured against his helmet . . .

"Switching to relay two," said the staff sergeant softly, after what seemed like an eternity. Ships in the Pacific would be tracking Post now.

And then, fifty-one minutes after the last sound from the spaceship, just at the crucial end of the first hour which represented the limit of his predecessors' endurance, Post came back. They heard the faint high echoes as the emergency air supplies were released into the cabin, and hope dawned in their eyes as they exchanged glances. Foley turned mutely inquiring eyes on the wing commander, who nodded and tapped the tell-tale dial. The needle was steady.

"Thank heaven!" said Taunton, prayerfully. "Is he safe?"

The wing commander looked at his right hand. It was shaking uncontrollably. "Depends what you mean by safe," he said dryly. "He's

got enough juice left to knock him out of orbit, if that's what you mean. We could re-programme the remote control computers for an economy braking schedule, if you want one, but he's supposed to land with fifteen tons' reserve in hand, and he's lost less than half that."

The wall speaker interrupted. "Hullo, base. Post here. I fixed it."

Taunton bent to the mike. "Are you all right?" he asked in an aching voice.

"I'm fine, sir. Bit cramped, of course, and I'll have to dream up some way of wiping the juice off my suit before I dare crack my helmet—the air's full of drops of it. If I can't get out to eat, I'm going to be awfully hungry before I get down again." He didn't sound particularly upset by the prospect.

"What was wrong?" Taunton pressed him.

"The bleed cock on the pipe you mentioned. It had fractured at the base and come clean away."

"But that's impossible!" said the flight lieutenant. The wing commander raised a quizzical eyebrow at him.

"Impossible or not, it happened," said Post. "I covered the hole with a couple of hull

sealing patches. I hope I don't get holed by any meteors after this—I had to use the two biggest for the job. I hung around and watched for a while, but the flow's stopped."

Foley and the wing commander looked at each other and smiled. No one else noticed.

"How are you feeling?" Taunton demanded.

"A bit weak in the knees, sir, but otherwise all right. I'm mostly glad it wasn't worse."

"So are we," said Foley loudly, and Post chuckled in reply.

"Well, I'll keep my fingers crossed in case anything else goes wrong. Let me know if you spot anything before I do."

"Of course."

"That's fine, then . . . I'm getting used to this floating sensation now. I'm going to undog the observation ports and have a look at the Earth."

They tensed. This was the crucial point. Of course, the pilots on the trouble-free trips had reached this stage much earlier. The breakdown might only have been postponed, for the ship was a world to itself, but space was—bigger, perhaps, than the

others had been able to stand.

After a moment there were clicking sounds, and then a deep sigh.

"Lord, but that's beautiful!" said Post. "Just like the maps, too." He chuckled. "Only it looks as if it was made of glass, with colours painted on it, and lit from inside. And those stars—I never dreamed they could be so bright."

They waited.

"Whizzing past me, too," Post added musingly. "This is better than a TV show. I could watch it for ever, the way I feel just now. I suppose I'd better make the most of it while I've got it."

Taunton glanced at Foley, the tense lines of his face beginning to relax, and saw that the psychologist's nails were clenched into the palms of his hands. Then the taut fingers uncurled by slow degrees, and a smile spread over Foley's face.

"He'll be all right," he said. "He'll be all right."

They listened with relief to Post's calm, matter-of-fact description of what he was seeing until it was almost beyond doubt that he was quite at ease. At the end of another half hour, he had cleared away the floating

droplets of propellant and removed his helmet. He signed off the transmission in order to eat his rations, and they turned away from the speaker, smiling.

The flight lieutenant looked puzzled for a moment, and then tapped the glass of one of his telemeter dials, as if it were a barometer. Then he opened the panel and examined the wiring carefully.

The wing commander sat down with a sudden exclamation on the edge of the signals desk and looked meaningly at Foley, who nodded tensely.

"What is it?" Taunton asked, noticing their looks of dismay.

"Some of these dials have stopped registering," said the flight lieutenant between his teeth. "It may only be a fault in the relay system, of course——" He turned hopefully to the staff sergeant, who shook his head.

"The circuit's all right," he said.

"Then what's wrong?" Taunton insisted.

"Well——" The wing commander seemed to be having difficulty finding words. "Well, sir, it's not usual to make the circuits in a spaceship waterproof. There's something like seven tons of propellant float-

ing around the guts of that ship. As soon as it seeped into the telemeters, of course, they stopped functioning."

He got up and looked thoughtfully at the board. Another of the meters went dead.

"Now all we can do is hope that it doesn't get into the remote control mechanism as well," he finished. He turned to Foley with a frightened look in his eyes. The psychologist answered the question before it was asked.

"No, don't mention the idea to Post. He may think of it himself, but don't call his attention to it if you can help it. It may only be the telemetering circuits which are affected."

"I don't understand it," the flight lieutenant said, after a while. Taunton turned grey eyes on him.

"Understand what, young man?"

"How that bleed cock came to fracture, sir," the other answered. "I helped to go over that ship inch by inch before the blast-off, and there wasn't a single part within a thousand hours of fatigue fracture."

Taunton glanced at the wing commander. "Is that right?" he demanded.

"Yes, sir," the wing commander answered tiredly. "It shouldn't have happened."

The general, Foley thought absently, looked like a terrier who had just scented a rat. He said, softly: "You mean it might be sabotage?"

"Surely, general," interposed Foley, "there's bound to be an inquiry."

"Yes, by thunder!" Taunton asserted. "And it might as well start now, too!" He strode over to the telephone on the far wall of the blockhouse, and shouted for his adjutant's office.

Foley found he was almost physically sick with tension, and deliberately relaxed himself with a dozen deep breaths. Then he settled down to wait. The hours passed, more slowly than he would have believed possible. Between Taunton's occasional threats that he would court martial someone, and the solemn, measured announcements from the Air Force officers that yet another instrument had been put out of action, he found time to appreciate the superb irony that, in the midst of their first successful shot as far as the human side was concerned, they were biting their nails over the near-impossible—a mechanical breakdown.

For Post was not only still sane—he was enjoying himself.

And then, at last, it was over, and the remote control apparatus was still untouched. They heard the jubilant voice of Dolman from half around the world describing the sight as the spaceship, its glider wings heated almost to incandescence by air friction, settled in a cloud of steam on the surface of the sea and rode, gently rocking, towards the tender awaiting it. The flight lieutenant wiped his forehead and shut off the remaining telemeter switches.

"God, I was scared something else would go wrong!" he said with naked honesty.

"But it didn't," said the wing commander slowly.

"No," Taunton agreed. "No thanks to whoever it was who tried to wreck the ship. I'm going to file a report and have a board of inquiry assembled at once."

Foley brought out his pipe and filled it, a great calm pervading him. "Is it all that necessary, general?" he inquired mildly. "The damage wasn't serious, you know."

"Not serious?" Taunton echoed. "It only came within an ace of losing us the ship!"

The wing commander interrupted him. "I beg your par-

don, sir. There wasn't the slightest risk of it endangering the ship."

"But if the propellant had got into the remote control circuits——"

"It couldn't have, sir. If you care to consult the mass manifest, you'll find that there's a new entry made for this flight—seventeen pounds of plastic oil and water-resistant insulation to seal the remote controls."

Heavy sarcasm coloured Taunton's words as he answered. "That was very fortunate, wasn't it? I suppose you knew someone was going to sabotage the ship in advance?"

"Of course he did," said Foley, getting to his feet. "I told him about it."

For a moment he feared that Taunton might be going to have apoplexy. The general's face purpled, and he struggled to speak, but he soon recovered. Before he could utter a word, Foley pressed on.

"General, you know the way the three earlier pilots—Marlow, Reeves and Sander-son—described their experience. They said it was like being rushed headlong into nowhere by something they couldn't control. Compare it to being in a car, say, whose

brakes have failed while descending a steep hill—a terrifying experience. But in a car you have at least the chance of running the vehicle into the hedge to stop it.

“Now suppose you knew beyond doubt that the brakes had not failed, because the car was perfect? And remember, in space there’s no hedge for you to crash into. Would you be able to keep your head if that happened? I think not.”

The general started to say something, amazed and angry, but checked himself in the middle of the first word. “Go on,” he said, slow interest dawning in his eyes.

“The trouble on all our previous launchings, and, I suspect, on the launchings made by other countries, has been that nothing went wrong. The ships functioned perfectly on unmanned tests. As a result, the pilots were, in effect, told they were *expected* to break down. They were put into ships carefully designed to prevent them from doing anything. They had no other role than to be carried, as they put it, headlong into nowhere.

“You were asking earlier”—it seemed in retrospect like ten years ago—“what special training I gave Post. I gave

him none at all, because the fault lay, not in the pilot, but in the ship’s designers. What Dolman and I were forced to conclude was that the ship must be proved to be subject to the man.

“We took the wing commander into our confidence, since he was responsible for supervising maintenance. Incidentally, he told us of something very similar which was discovered over twenty years ago in air pilots. To be in charge of a plane on full automatic control made them nervy and irritable, because they had no direct mastery of the aircraft. But they were quite happy even if all the instruments normally connected to the autopilot were, instead, fed to a single dial, and all they had to do was to keep an artificial horizon steady against a set of markings.

“What we did, then, was to impress upon Post that he was the important part of the ship. It made him more alert and restored his self-confidence. He was no longer powerless in face of the unknown.”

“But damnation, man!” exploded Taunton. “Think of the risk you were taking!”

Foley allowed silence to make his answer for him—

that events had justified him. The wing commander broke in, acutely conscious, now that the immediacy had ended, how near he stood to wrecking his career.

"We thought very carefully beforehand," he said. "We had to cause the minimum danger and the maximum trouble. We fatigued the bleed cock with ultrasonics so that it would break loose under the acceleration, but of course, since the pipe was at the top—the nose end—of the tanks, the acceleration would keep the propellant away from it and prevent any wastage until the jets cut out. That ensured that the ship went into the right orbit, you see. There was no leakage until the juice drifted in free fall."

Taunton bit his lip and breathed out gustily. "I ought to have you shot for treason, both of you," he said softly. "But you must have gone

through enough hell already in case you'd guessed wrong. You've got guts, both of you—that I have to admit. And I like to see men stand up for their ideals."

He looked around commandingly. "I think this might remain within these walls?"

The rest of the group nodded enthusiastically. They looked with frank admiration at Foley, who removed his pipe from his mouth and gazed at the red in the bowl.

"Of course," he said delicately, "there will inevitably be an inquiry, and things will have to be explained in the end. But with a little judicious—uh—hindrance, general, by that time we might well be on the Moon. And no one is going to quarrel with results like that."

He got up and stretched his cramped muscles. "Perhaps," he added thoughtfully, "I'll see you there."

INTERNATIONAL FANTASY AWARD

The International Fantasy Award Committee has pleasure in announcing that the 1955 Award Trophy was presented to the American author, EDGAR PANGBORN, for his outstanding science fiction novel, *A MIRROR FOR OBSERVERS*, published by Doubleday & Co., Inc. (U.S.A.) and Frederick Muller, Ltd. (England). A certificate of merit was awarded to author Hal Clement for his novel *MISSION OF GRAVITY*. Third place was shared by J. T. McIntosh's *ONE IN THREE HUNDRED* and Isaac Asimov's *THE CAVES OF STEEL*.

It's important to make a good

First Impression

by FRANK WINNARD

IT RESTED IN A TINY VALLEY, smooth, rounded, sleek and glinting a little in the light of the afternoon sun. It looked a little like a soup tureen, an inverted pie dish, a flattened hemisphere of greyish metal.

It looked like a flying saucer.

George made a sound between a grunt and a whinny, stepped back hard on Fred's instep, and began to run back down the narrow path they had been following. Fred, despite the pain in his foot, managed to catch him before he had gone a hundred yards.

"What's the matter?" he snapped. "Why are you running?"

"That thing." George jerked his thumb back towards the valley. "It wasn't there yesterday."

"That proves it."

"Proves what?"

"That it's a flying saucer."

"That," said George grimly, "is what I already figured." He made as if to run down the

path again, then halted as Fred grabbed his arm.

"Wait a minute!" Fred, his unshaven face intent beneath his three-day stubble, dug his fingers into his companion's arm. "Take it easy. Can't you see what a chance this is?"

George jerked at his arm. He was about twice as big as Fred, so for him it was easy. Aside from his extra size, he and the smaller man looked exactly alike in their tattered clothing and stubbled chins. Hobos, or Gentlemen of the Road, as Fred insisted they call themselves, had much in common.

"Hold it," pleaded Fred, as George headed down the path. "This thing could make us both rich."

"Rich!" George came back. "How?"

"Simple." Fred frowned as he tried to remember what he had read on the subject. As his reading was confined solely to the luridly illustrated Sunday Supplements of the

newspapers he wore in lieu of underclothes, he suffered from a slight handicap in his education. That handicap he would have worked before admitting.

"Listen. That saucer has landed to make contact with the human race. That's us. Now, if we work it right, we'd be in on the ground floor of anything that was going. Trade concessions! Private interviews! The go-betweens between the aliens and the government. The publicity alone would be worth a fortune. The photographs, statements, endorsements, radio and television broadcasts. George! We'd be rolling in it!"

"Money," said George simply, and licked his lips. "When do we start?"

"Now, before anyone can beat us to it." Fred led the way back towards the sheltered valley, explaining as he went. "Leave this to me. I've read all about it and a dumb ox like you would only go and spoil things. The first thing to do is to contact them, and do it without arousing their fear or dislike. We

must be brave, intelligent, understanding, kind and forthright." He looked at George. "Put down that club."

"Must I?"

"Yes. We mustn't show hostility or fear, and a club, or any weapon, is an admission of both. We'll walk towards it with our hands exposed to show that they are empty, and a smile of welcome on our faces." He shuddered at George's grimace. "Is that the best you can do?"

"I'm not a smiling man," grunted George. "You sure you know what you're doing?"

"I'm sure." Fred took a deep breath. "Ready? Then follow me."

Together they strode towards the flying saucer.

It lay at the bottom of the little valley, the grass scorched at its edges, and it was completely devoid of windows, jets, propellers or other forms of recognisable motive power. Aside from one small opening, the smooth hull was completely sealed.

George stared at the opening, trembled, and only Fred's

grip on his arm kept him where he was.

"Don't move," hissed Fred urgently. "If you try to run it might blast you to a cinder."

"Yeah." George gulped and took another look at the thing in the opening. "Hell! It don't even look decent."

"It's only unfamiliar, and we are intelligent enough to accept the fact that intelligence needn't be confined to the human race." Despite his words, Fred felt thick streams of sweat running down his face and he had to fight the desire to run.

The trouble was that the thing was nowhere near human.

It squatted in the shadow of the opening, six feet tall, four armed, covered with short rust-coloured fur, and with wide, unblinking eyes. If it resembled anything at all, it was a monkey, but it only resembled that as a dog resembled a sheep. It didn't speak.

"What now?" whispered George.

"Walk towards it." Fred swallowed and tried to remember what he had read. "Be calm and dignified. Make out

as though we've done this before. Don't let what it looks like upset you. Think of the money."

"Yeah, but what'll we say?"

"You keep quiet," said Fred. "I'll do the talking." He forced his reluctant legs to carry him to within ten feet of the alien. "Good afternoon," he said politely. "Could we be of assistance?"

That, he thought, was rather neat. A cultural greeting coupled with an offer of assistance, both delivered in welcoming terms and expressing calm acceptance and understanding of both the saucer and its pilot.

The thing didn't answer.

"Maybe it didn't understand you," whispered George. "Try again."

Fred nodded. "Where are you from?"

Silence.

"Are you in trouble?"

Silence.

"Can you hear me?"

Silence.

"This," said George bitterly, "isn't getting us anywhere." He glared at the alien. "Hey, you! Are you

deaf or plain dumb? Is that thing a flying saucer?"

The thing turned, looked at George, then resumed its original position.

"You fool!" Fred grabbed George and dragged him out of problematical earshot. "After all I've told you, to say a thing like that!"

"What was wrong with it?"

"A complete betrayal of our native intelligence and lack of ability to extrapolate from given data."

"Uh?"

"The thing is here," explained Fred irritably. "It wasn't here yesterday. It wasn't carried here, or built here, and we know that it didn't grow. What else can it be but a flying saucer?"

"I know."

"Then why ask the alien what the ship is if you already know? For Pete's sake leave this to me; you'll only go and spoil everything."

"How can I?" asked George reasonably. "It don't answer, so it can't understand what I say."

"We can't be sure of that," said Fred. "It may be testing us." He frowned towards the

creature in the opening. "Anyway, it will later, after it has learned the language. It's probably got a highly retentive memory and will be able to remember every word and gesture we use. Hell, George! You've made it think we're a couple of morons!"

"Maybe, but what's so wrong with being a moron?" George spat reflectively on the grass. He seemed to be losing his first fear of the creature. "What makes you think it can hear, anyway?"

"It turned to look at you when you spoke." Fred began to fumble in his pockets. "You got a stick?"

"No. What you want a stick for?"

"Sign language. You sure you haven't got a stick?"

"I'm sure."

"A knife then," snapped Fred irritably. "Anything to scratch the ground and make marks."

"I've got a switch-knife. Will that do?"

"Yes." Impatiently Fred snatched it, pressed the stud, and six inches of steel flashed in the sunlight. "Now, stay close behind me and don't say a word."

Cautiously, he advanced towards the alien and, when about six feet away from the opening in the saucer, squatted and began to scratch at the ground. He drew a series of shaky ellipses, dotting them with irregular splotches. He pointed towards the sun and then to the central splotch. He pointed towards the ground, swept his arms around him, and pointed towards the splotch on the third ellipse. George watched him with interest.

"What's the idea?"

"I've drawn a schematic of the Solar System," said Fred importantly. "The alien will be able to recognise it for what it is. That will make him realise we know something of astronomy and science." He stared at the watchful alien. "I'll try again."

He repeated his pantomime, jerking his finger at the sun, stabbing it at the central blob, slapping the ground, pointing to himself then to the third ellipse.

"It don't seem interested." George stared at the silent creature before them. "Maybe we should try something else?"

"Such as?"

"Getting away from here before it jumps us. For all we know it might be getting hungry."

"So what? Intelligent creatures don't eat other intelligent creatures; if they did then they wouldn't be intelligent."

"If they did then the ones they ate wouldn't be intelligent, you mean," corrected George. He glared at the alien. "That thing would look a lot better in a cage. Let's go and find someone to put it in one."

"Don't be a fool," snapped Fred impatiently. "For all we know it might still be testing us. If we leave now it will be a confession of failure."

"So I'm a failure," said George. "So what?"

"So the thing won't let us be its managers, that's what." Fred grabbed at George's arm. "You know what managers make? A third, maybe more, of the gross take. You want to lose that?"

"No," said George, and stopped. "But how can we get rich if we can't even talk to it?"

"Publicity, that's how." Fred looked at the alien.

"Look, it's got hands of a sort. We could have our picture taken holding it by the hand."

"They don't look much like hands to me."

"They're hands, all right. They must be hands, it couldn't have built the ship without hands."

"A monkey's got hands," pointed out George. "But a monkey ain't intelligent."

"This is no monkey." Fred stabbed at the ground again, digging the blade of the knife deep into the soft dirt. A blob followed by a straggling line. Two blobs, followed by the figure 2. Three blobs and the figure 3. George frowned as he watched.

"What's it this time?"

"The basic mathematical symbols." Fred sweated as he gouged at the ground. "I'm showing it that we are aware of the decimal system and mathematics in general. First, I show it our numerology, then simple addition, multiplication and division. By correct use of numerical groups I can prove to it that we operate on a basis of strict logic." He swore as he

nearly amputated his thumb.

"Interesting," said George dubiously. "I don't understand it, but it sounds interesting. Did you learn that from reading, too?"

"Yes." Fred paused and wiped his forehead. "It's lucky I was with you when you found this thing. It needs an intelligent man to do what I'm doing. Be quiet now and let me concentrate."

An hour later Fred was still concentrating. He had slashed the ground over an area of a hundred square feet and was wringing with sweat. The alien, as calm and as watchful as ever, had done nothing but move slightly to follow his progress. George stared at it with disgust.

"Hell! We're just wasting time."

Secretly, Fred agreed with him but tried to defend science against instinct. "We can't be sure of that. The thing may be in telepathic communication with its fellows. For all we know we may have passed the test and been accepted."

"Accepted for what?"

George spat and reached for his knife, testing its edge

carefully with the ball of his thumb. "We'll never get rich this way. There's only one thing we can do."

"What's that?"

"What we should have done at first. Go and get a couple of clubs, knock its head off and help ourselves to what's inside."

"Are you serious?" Fred stared at his companion in horror. "To wantonly destroy a visitor from space, to kill it for the sake of material gain? And how could we get away with it, anyway?"

"Simple. We creep up on it, either side. No need for clubs even; as it grabs at you, I'll let it have it." George tested his knife again. "It ain't human, so it wouldn't be murder. We'll probably get a medal for doing it. Ready?"

Without waiting for an answer, he began to creep forward, his body tense, his knife gripped in the fighter's stance. Fred didn't doubt but that George could do as he said. He had seen him in too many brawls to doubt the big man, and it did seem the only way.

"Don't kill it," he insisted.

"Just divert it. We can duck inside and slam the door. It will have to communicate with us then."

George nodded, not answering. Together, the two men crept forward.

It was as if the sky had come down and slapped them in the face. One second they were creeping forward, the next they were flat on their backs. George yelled as the knife was knocked from his hand, and Fred, after blinking away a host of stars, found his feet beneath him and his legs carrying him away from saucer and alien both.

He skidded to a halt as he saw someone walking towards him from the edge of the surrounding wood.

"Good afternoon, gentlemen," he said. "No damage, I hope?"

"Got a gun?" George came panting up beside them. "That thing's dangerous."

"Surely not." The stranger didn't smile, but his voice held subtle amusement. "Did it harm you?"

"No," admitted Fred. "But it sure scared us." He looked

at the stranger. "Where did you come from?"

"Around."

"Are you a newspaper man?" Fred didn't wait for an answer. "Listen. That thing is a flying saucer and we found it. I've been trying to communicate with the pilot but he's dumb or something. I've tried semantically correct phrases, mathematical symbols, schematics, the works just like what was in that article I read, but nothing seems to work. But we found it first, remember that."

"Interesting." The man stepped forward. "Trying to communicate, you say?"

"That's right." Fred stared in horrified anticipation as the stranger approached the alien creature. "Be careful, mister; you saw what happened to us."

"Yes," said the man calmly. "But then, you were trespassing, weren't you?" It wasn't a question. He passed the alien, patted it casually on the head, and it followed him into the ship. The door closed, something droned like a hive of angry bees, the saucer lifted, hovered for a moment,

then, with fantastic speed, vanished into the sky.

George spat.

"We could have got in that ship," he said slowly. "We could have fetched clubs and knocked the head off that thing and made ourselves rich." He looked at Fred. "We could have done all that, only you had to be smart, didn't you? You had to show off."

"It was the right way," said Fred defensively. "The article said so."

"Sure," said George, his voice bitter and heavy with sarcasm. "You did everything just right—only you forgot the important part. You were so keen on making a good impression you forgot to find out who you was making it to." He began to chuckle. "All that guff! Mathematics and semantics and the rest of it. Digging up the dirt and waving your arms like a fool. Wait until the boys hear about this! Old Professor Fred trying to talk to a . . ." He doubled with helpless laughter. ". . . to a dog!"

Fred didn't feel like laughing.

The way to the Planets

by A. E. ROY, B.Sc., Ph.D., F.R.A.S., F.B.I.S.

9—Our Nearest Neighbour

IT IS A FORTUNATE MATTER for the future of spaceflight that the Earth possesses a nearby neighbour, the Moon, on which man can build his first extra-terrestrial base.

The nearest planet, Venus, is one hundred times as far as the Moon, on its closest approach, even if a spaceship could move in a direct line between the Venusian orbit and the Earth's. As it is, it is extremely unlikely that the first planet-to-planet orbit will be of this form, but will consist of the fuel-saving elliptic orbit that touches the two planetary orbits at its perihelion and aphelion. This means a trip of some 280,000,000 miles, lasting some 250 days, instead of the comparatively small 240,000 mile lunar journey, lasting five days. We shall see later, too, that interplanetary travel from a lunar base may be far more advantageous than from

the vicinity of the Earth, since the propellants necessary may, in time, be mined on the Moon. Again, the problems of landing on an airless planet will be the first requiring solution by the first manned expedition to touch down on the Moon. Finally, the expedition will be approaching the heavenly body of which most is known.

Now, just what is known about the Moon? We will summarise briefly in this article the present state of knowledge about our satellite for, by doing so, many of the problems facing the construction of a lunar base will become obvious.

I have just said that the Moon is the best-known of our neighbours in space, and that is undoubtedly true, but from another viewpoint the Moon is the Cinderella of the skies, being neglected, especially in the present century, by the professional astrono-

mers. Most of our recent knowledge concerning the satellite comes from amateur astronomers, chiefly members of the British Astronomical Association. The reason for this is not far to seek when we consider the history of astronomy since Galileo Galilei first turned his newly-built telescope to search the face of the Moon in 1610.

For obvious reasons the Moon was the body most closely studied in the 17th and 18th centuries, and by 1813 various lunar maps had been constructed, detailing the prominent features on that side of the Moon constantly turned towards us. Among these maps are Mayer's and Schröter's, and they reproduce most of the features known to us today—not all, as I shall show later.

Then came the great Johann Mädler, whose work became the standard authority of the subject. By the middle of the 19th century the picture of the Moon was of a barren, airless world, waterless, exposed to the burning rays of the Sun or the bitter cold of space, a world of jagged

mountains, craters, seas of pumice dust and lava, great chasms and wide plateaus. In short, it was a dead world, and as telescopes became larger and the spectroscope was developed, the interest of professional astronomers turned elsewhere, leaving observation of our nearest neighbour chiefly to the amateurs.

The picture drawn above of the Moon is, in essentials, true, but would leave the observer under the impression that "nothing ever happens on the Moon," that our satellite is a vast, dusty, sterile museum of relics of past turbulent volcanic activity. Perhaps the better description is that "nothing much ever happens on the Moon"!

In 1866, Julius Schmidt, Director of the Athens Observatory, made the announcement that Linné, a small crater in the Mare Serenitatis, had disappeared. Linné was described by the older observers and was not a difficult object to see. Mädler had seen it, and Schmidt himself observed it before the change took place from a walled crater of seven miles diameter

to a comparatively insignificant crater-cone, difficult to see, even in large telescopes.

Since then, other changes on the Moon have been observed to take place by Dr. H. P. Wilkins, P. A. Moore, K. W. Abineri and others, in careful studies of selected areas. We will return to these later. Before doing so, let us sketch briefly the main features of our satellite.

It is a globe some 2,160 miles in diameter, pursuing an elliptical orbit about the Earth at an average distance of 238,000 miles, though it can approach as close as 221,000 miles and recede as far as 253,000 miles. Its period of revolution is some twenty-seven and one third days. There being no free water on the Moon, the area of its surface is about 26 per cent. the area of dry land on Earth, so that its exploration will be a gigantic task, even if a dozen widely-dispersed lunar bases are formed.

One side is always turned towards us, though occasionally we can "see round the edges" a little, due to the

librations, so that some three-fifths of its surface has been mapped. We even know a little about the two-fifths of its surface we never see! Dr. Wilkins has published a map of the other side, a rather tentative one, it is true, but based on the evidence of ray-centres. Some craters on the visible side of the Moon, such as Tycho and Copernicus, are the centres of vast radiating streaks. These rays extend in some cases a distance of many hundreds of miles and are usually from five to ten miles wide. They do not seem to be elevated or depressed with respect to the general surface but pass across valley and mountain. Some authorities explain them as a staining of the surface by vapours rising from cracks too narrow to be visible. Others suggest that the great craters, that are their focal areas, are connected with them in the sense that they represent a "spraying" of the surrounding landscape when the craters were active, or that the "spraying" was caused when giant meteors in the Moon's turbulent past

crashed down to form these craters.

In a few places, near the edge of the visible surface, such ray-systems appear over the edge and can be traced back to ray-centres hidden from our terrestrial gaze. Again, mountain-chains can be traced back over the edge and it is in this way that Dr. Wilkins built up his map of the other side of the Moon.

Even a small telescope reveals the bleakness of the visible surface—indeed, Mädler and Beer's first-rate lunar map was completed using a refractor of only three and three quarter inches aperture! There are great "seas" such as the Mare Imbrium, not seas of water as they were once thought to be, but probably plains of solidified lava under a few millimetres of pumice dust. In addition, majestic mountain chains, such as the Apennines, run across the surface for hundreds of miles, containing peaks some 20,000 feet or more high. Indeed, Moore reckons the Leibnitz and Dörfel Mountains to be a full 30,000 feet in height,

higher than Mt. Everest. It is impossible to count the craters, walled formations often with a central peak system, that range in size from Bailly, 170 miles in diameter, to thousands of small craterlets or pits a few yards across. Often these craters are arranged in chains, as if along fault-lines in the lunar surface. There are also cliffs, ravines, domes and the mysterious ray-systems we have mentioned, spreading across the surface of the Moon.

One main difference between the physical features of the Moon and the Earth is the absence of erosion by wind and water on the former. The vast temperature range on the Moon—the sunlit side can reach 212° F. (the boiling point of water) while the temperature during the long lunar night can reach minus 250° F.—will undoubtedly cause some erosion by expansion and contraction, but in general there is no erosion as we know it. This is one reason why we believe that the Moon's atmosphere, if it exists, is extremely tenuous.

Other pieces of evidence supporting this opinion are the lack of appreciable lunar twilight, which would be best observed near the horns of the crescent Moon, the sudden disappearance of stars occulted by the Moon, the clarity of lunar features, and the fact that the Moon's surface gravity is too small to retain any but the heaviest gas-molecules at its surface. But in spite of all this, there is some slight evidence that a tenuous lunar atmosphere, of density not more than 1/10,000 that of ours, exists. Mists are sometimes seen in some of the craters; the lack of visible meteor impacts on the surface of the Moon also suggests the presence of a tenuous atmosphere that protects the lunar surface possibly even more effectively than the Earth's atmosphere does. In case this seems paradoxical, we must remember that lunar gravitation is only one-sixth of its terrestrial counterpart, so that the density of a lunar atmosphere would fall off far less quickly than the corresponding terrestrial atmosphere. Thus, above

a certain height, the lunar atmosphere would be denser than the Earth's.

Lunar mists have been observed for over a century by various selenographers. Some of these mists last for over twenty-four hours, obscuring well-known surface features. Moore has recorded a white mist, seen on August 2nd, 1939, that completely covered the boundary and floor of the great walled plain, Schickard. The interiors of Plato and Conon have been seen mist-filled on many occasions. It seems likely that the last vestiges of volcanic activity are present on the Moon in certain areas, and it is noteworthy that one of the last "gasps" of a volcano is the exhaling of carbon dioxide gas, which may form these mists.

Other possibly-changing physical features noted by recent observers are the domes and the dusky streaks. Neither of these were shown on the maps and drawings of the older observers, though they are easily observable with a moderately-sized telescope. A problem requiring solution

is why the earlier observers failed to detect them. Both Wilkins and Moore believe that the answer may be that these features are of recent origin.

The domes are low, rounded hills, ranging in size from two to three miles across and a few hundred feet in height. Dr. Wilkins has described them as resembling unburst bubbles, but the strangest thing about them is that nearly all have a deep pit right at the top. This pit is always on top and never at the side. It is possible, suggests Dr. Wilkins, that local swellings of the lunar surface take place here and there and that the resulting domes may not be entirely solid, but cavernous in their interiors and, with a little tunnelling, would make excellent natural shelters for future spacemen.

The dusky streaks bring us to consider the possibility of life on the Moon. Life in its more familiar aspects is obviously impossible with lunar conditions as we know them, but we also know (see *Authentic*, September, 1955) that life, even on Earth, can exist

in fantastic forms, adapting themselves to the most rugged and unfavourable environments.

On some of the crater floors and on some of the inner slopes of many crater walls, systems of streaks or radial bands are to be seen. The system in Aristarchus was the first to be studied. There, dusky streaks radiate from the brilliant central mountain over the floor and up the sides. In this case, we have drawings of them made by Lord Rosse in 1863. Phillips may have seen them in 1866. The other famous lunar observers made no records of them. But since 1895 the bands seem to have not only steadily increased in visibility, but grown in numbers.

Matthew, Smith and Favarger have shown that the bands have a periodical development, becoming longer and broader as the lunar day passes, reaching their peak about lunar noon, and then fading away. At the present date more than a dozen of these systems of streaks are known, and Moore has stated that the single band in the

crater, Kies A, seems to be increasing in distinctness.

Both Moore and Wilkins think it quite likely that these streaks or bands are due to the presence of some low form of life, probably in the nature of lichens or fungus. As the Sun rises over these craters and warms them, gas is exuded, and possibly such a primitive form of life may develop, to wither away when the bitter cold of the lunar

night descends once again.

It is evident, then, that our nearest neighbour is well worth a visit, but that many problems will require solving before the lunar base is set up, problems of extreme heat and cold, of lack of air, food and water, and the utilisation of the materials at hand. Next month we will see what progress has been made already in solving such problems.

THE SPACESUIT IS HERE

SINCE THE FIRST MEN ON THE Moon will require a spacesuit, let us see how far it has already come into being in high-altitude flying. The Air Research and Development Command's Aero Medical Laboratory at Wright Air Development Centre, U.S.A., has designed a completely enclosed suit, now in use, which gives airmen full protection in the event of cabin pressurisation failing at high altitudes. Normally oxygen is fed in from the aircraft, but an emergency oxygen cylinder is attached to the suit which has a one-piece helmet with electrically heated face-piece

to avoid frosting. There are tubes along the pilot's arms and legs in order to pressurise the suit if need be. In addition to giving its wearer protection from the vacuum of space, it is also an anti-g suit, operating automatically when the aircraft's manœuvres subject the pilot to many-g accelerations. Since rocket-planes now reach altitudes where the air-pressure is almost zero, it is seen that this flying-suit is obviously the forerunner of the types to be worn by the first astronauts, and that some of the problems have already been solved.—A.E.R.

Is it true about—

Parthenogenesis

by B. DIXON MALLORY, B.Sc.

DESPITE WHAT YOU MAY have read in the popular Press, and despite what you may have been told by "scientists" of your acquaintance, no one is yet in a position to state with certainty whether parthenogenesis does or does not occur in mammals.

Mammals, you will remember, form the highest group of the animal families; they are, by common assent, most removed from the primitive. They are the animals which possess hair, mammary glands and the capacity to bring their offspring to a high stage of development while still within the body of the mother. They are "advanced."

On the other hand, no one who knows anything about zoology will dispute the fact that parthenogenesis is a frequent event among many lower groups of animals. Among those that lack a spine—the invertebrates—parthenogenesis is very com-

mon indeed. It becomes less common as you go up the scale of evolutionary advance, except for certain highly organised families, such as the arthropoda, where it still is of considerable importance in the continuance of the species.

At this point we might as well be clear about what parthenogenesis is. It is all very simple. In the kingdoms of living things—plants and animals—there are two main methods by which species reproduce their kind. One is asexual, the other is sexual. In the asexual form, the offspring are entirely produced from a single individual—for example, the yeast plant reproduces by budding off "daughter" individuals; and the common tapeworm reproduces by budding off individual segments. Both of these species, as well as many others, can also reproduce sexually. Some very primitive species—such as, *Amæba*—

can *only* reproduce asexually.

The sexual form of reproduction of necessity involves two of something. Most commonly it involves two individuals, who are said to be of opposite sex. Sometimes, by no means rarely, it involves two different types of organs in a single individual. When these two sets of organs occur in one individual, the individual is called an hermaphrodite. The tapeworm is again an example. In the ultimate, sexual reproduction requires the meeting of a male cell (of a special sort) and a female cell (of a special sort, too). Usually, the male cells are formed and released from one individual—known as the male—and the female cells are formed but (often) not released from another individual—called the female. This is all straightforward, isn't it?

But then there is this other form of reproduction which involves an individual which is, by all the signs, an ordinary female, and yet does not require the co-operation of a male. This is parthenogenesis. It is not by any means the same as asexual reproduction, for a sex cell is involved—the female sex cell. And it is not by any means the same as

sexual reproduction, because only one type of sex cell is involved.

Perhaps the commonest example of parthenogenesis is found in the honey bee. Here, the queen bee lays a whole mass of eggs, some of which are fertilised (i.e., have met a male sex cell) and some of which have not. Both types of eggs hatch out into individual bees. The fertilised eggs give rise to female offspring and the unfertilised eggs give rise to male offspring. Many other kinds of insects (all of which are arthropods) reproduce in this manner regularly. The pestiferous greenfly, some ordinary flies and quite a few butterflies and moths regularly produce both males and females during the autumn, but produce only females in the spring. These latter reproduce parthenogenetically.

So much for the invertebrates. Parthenogenesis is known to occur commonly among them and there is no dispute about it.

Now among the vertebrates—the animals with backbones—it is, as we have said, a very different matter. Here, the almost universal rule is straightforward sexual reproduction. Asexual reproduction

is quite unknown. Hermaphroditism is sporadic and usually the result of an abnormality. Parthenogenesis is . . . debatable.

It has been known, however, for a great many years that if you take a frog's egg and prick it with a dirty needle (a clean one won't do the trick!) it will start to divide in just the way it does after having met a male frog cell. But (and here lies the rub) no one has ever produced a frog in this fashion. The pricked egg, after undergoing one or two divisions and turning into a little ball of cells, gives up the ghost and dies. Time and time again scientists have tried with the frog, and other species, to get such an unfertilised egg to "go to full term," so to speak. But no one has yet succeeded. That does not mean that it is impossible.

Now, in the scientific literature of the world—that is, leaving out all the somewhat suspicious reports of folk-lore and natural history—there are claims that parthenogenesis has been observed to occur spontaneously among certain types of vertebrates. By spontaneous, we mean that it "just happened"; no one tried to make it so.

As with the frog, so it has been reported that the eggs of cats¹, ferrets² and turkeys³ may begin to divide without the stimulus of meeting a male sex cell. This many people can swallow, for it does not amount to very much. In none of these cases did a fully-formed—or, for that matter, partially formed—individual result. The atypical egg simply formed a small cluster of cells.

Much more startling, and much more difficult to accept, are the claims that fully developed offspring may be produced parthenogenetically in the rabbit⁴ and the guppy⁵. The scientists who worked with the guppy claim that parthenogenesis occurred spontaneously on at least ninety-two occasions. Those who favoured the rabbit claim that they achieved their results by cooling the fallopian tubes—the ducts down which the eggs normally pass after release from the ovary.

It must be admitted that there is no theoretical reason why parthenogenesis should not occur in mammals or any other class of vertebrates. But there is a very strong prejudice against accepting these claims for a number of fairly good empirical reasons.

For one thing, it seems rather odd, when you consider how many hundreds of thousands of colonies of rats, mice, guinea-pigs, rabbits and other experimental animals that are maintained in laboratories throughout the world, that this kind of reproduction has been observed only rarely and only recently. It is, you must realise, the common practice in laboratories to keep the males and females isolated except for breeding purposes. There would seem to have been ample opportunity for parthenogenesis to occur very frequently, if it could occur at all.

In addition, there is the very pertinent matter of genes. When sexual reproduction occurs, the offspring possesses two sets of genes, one set from the mother and one set from the father. One of the special things about the sex cells is that they contain only half the number of genes required by the other cells of the body. During the formation of the sex cells there is a reduction in the number of genes. For example, the human body cell contains forty-eight chromosomes, each with a definite number of genes. The human sex cells contain only twenty-four chromosomes,

and so contain only half the normal number of genes. This situation is put right, of course, when the two sex cells meet. The twenty-four chromosomes from the mother team up with the twenty-four chromosomes from the father, and the cells formed by subsequent division of the fertilised egg all contain the requisite forty-eight chromosomes.

Each species has its own special "chromosome number." If ever an individual turns up with a different number—as sometimes happens with a mutation—that individual is abnormal in some very obvious way. What, then, about parthenogenesis among mammals? If the individual is truly formed parthenogenetically, then it has only half the proper number of genes in each cell of its body. And since, very roughly, each gene is responsible for the appearance of a certain character—blue eyes, for example—then you would expect the parthenogenetic individual to be lacking in, very roughly again, half the normal characters. But those who claim to have observed parthenogenesis among vertebrates also claim that the offspring appear normal!

Now, there are two main ways in which to explain these claims. The first is to state that the investigators are deliberately misleading us, that they are lying. This is a serious imputation against anyone, and even worse against a scientist, so we should exhaust all other possibilities before adopting that view. The second way to explain these claims is to believe that the investigators are themselves misled, that they are mistaken. This could be the case for several reasons.

It might be that a male animal got into and got out of a cage containing a female without the investigator's knowledge. Frequently in rat colonies, unless very special and expensive cages are used, wild rats get into and out of the female cages. Again it is not unknown for the animal tenders to let a male accidentally slip into a female's cage—and not think it worth telling the scientist in charge of the laboratory. One can go on thinking up accidents of that kind. What it boils down to is, that in no case reported have the females been under *constant* observation by the investigator—which, after all, would be asking rather a lot!

But, even assuming that the laboratory is so well run that accidents of this kind do not happen, there are various other reasons why the appearance of an offspring from an isolated female need not represent a case of parthenogenesis. The obvious answer would be that the female in question is really an hermaphrodite. That, too, would be most interesting, for rarely among higher animal groups can an hermaphrodite function as both male and female. Still, it is a possibility; and it cannot easily be ruled out. You may think that all one has to do is to examine the female to determine whether "she" is hermaphrodite or not. It is not as simple as that. Every higher animal possesses vestigial sex organs of the opposite sex, and it is extremely difficult to prove beyond any doubt that such vestiges are non-functional. All one can say is that the chances of a mammal fertilising itself would appear to be extremely remote.

Another possibility is that the offspring of an isolated female is really not an offspring at all but a sister! It is within the bounds of possibility that an identical twin could reach a low stage of development inside the body

of its sibling and then, many years after the first one's birth, develop to full term and be "born." There are, indeed, several records in the medical literature of cases of monsters being removed from the abdomens of males, and the only explanation of this is that the monster is a delayed twin. (No one has yet suggested that the male produced the offspring parthenogenetically!)

Thirdly, we have the possibility that the female which gives birth to an apparently parthenogenetic offspring was herself fertilised when she herself was an embryo. In such a case, the offspring would be produced by a union of the mother's embryonic sex cells and the sex cells of the offspring's grandfather. There is nothing theoretically against this, but, once more, we have to admit that the chances against its happen-

ing seem to be extremely remote.

So far we have not dealt explicitly with the human species. This is because the matter is, so to speak, *sub judice* at the time of writing. An investigation into the possibility of parthenogenesis in the human, started by a national newspaper, has so far brought three women forward claiming to be examples. We would not wish to prejudice these claims in any way, for the repercussions on their family lives, in the event of disproof of their claims, would be considerable. But we must point out, in view of the vague way in which the investigation is being reported, that we know of no tests that can be applied to prove that these women reproduced parthenogenetically, though there are many tests which would prove that they did not. A sobering thought for all concerned.

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THE CREEP

by ROBERT PRESSLIE

HUMAN BEINGS and cats have this in common: both have a great tenacity for life. They can face death in any of its myriad forms and they will always try to fight it. They don't always win, but they always try. Some animals seem to answer death's call willingly and blindly, like cattle in a thundering stampe over the precipice or like lemmings in their watery suicide. Humans and cats never give up the fight. Even when death has triumphed, their reflexes still struggle.

As Sam Garnet had divined, Lena Raynes had much of the feline in her make-up. This quality of the cat, together with her innate greed for life, was sufficient to bring her out of the psychosomatic shock which had reduced her to a witless, speechless child.

It was Lena who first heard the scrabbling at the door of Harry's Bar.

She was in a relaxed mood, as if she had just awakened from sleep. It was dark, but with the comforting weight of Sam's arm around her she wasn't afraid. And although the bar was quiet, the silence was not funereal. It was a warm and intimate silence, patterned with the slow, steady rhythm of Sam's deep breathing.

One side of her face was cramped and aching from its contact with the hard table surface. Without wishing to disturb the peaceful magic of the moment, she pressed her neck against Sam's arm and laid the other cheek on the plastic. Almost immediately she saw a pale green glow punctuating the darkness. It came from the dial of Sam's watch.

A stream of thoughts showered through her mind like April rain. The Creep. Secondary radiation in metals. Hours of proximity to that metal.

She smiled when the thoughts dried out in an instant and left no impression of fear. If the watch was radioactive, it was too late now to begin worrying. She smiled also at Sam's stubbornness in not removing the watch. And she realised with new understanding that her present attitude of indolent acceptance was the same as his had been all along—with one difference: she hadn't the slightest shred of belief that the Creep was killing her.

She lifted Sam's wrist to peer at the watch. It registered seven o'clock. When she released Sam's hand, it flopped back on the table. She had another smile to herself as she thought of the hangover he would have when he woke.

Then the noise started and the mood and the moment were gone.

If the bar hadn't been quite so still she might have put the noise down to imagination. But she had been so keenly aware of the silence, she knew the sound coming from the blocked doorway was real.

In an instant she was fully alert, all her senses geared to fight any danger, any further threat to snatch life from her grasp.

"Sam," she whispered. "Sam, wake up. There's somebody trying to get in."

The whisper was lost in the darkness. Lena lifted Sam's arm and ducked out under it. She felt in the newsman's pockets until she found his lighter. By the light of its pressured flame she found the candle on the table and kindled the wick.

"Sam," she repeated, louder, staring across the bar, trying to penetrate the gloom. When there was still no response to her entreaty, she cuffed him ungently. "Wake up, you drunken sot!" she said.

Sam lifted his head long enough to say: "Go 'way," and lolled into sleep again.

The sound at the door was getting louder. In other circumstances it might have been possible to duck Sam's head under water or force him sober with hot, black

coffee. In the urgency of the situation, Lena woke him with the only desperate means available. She tipped the candle and let a pool of hot wax splash over the back of Sam's hand.

He jumped out of his seat so fast he knocked it over. "What the hell was that for?" he rasped, as he rubbed the congealed wax from his skin. He frowned in his effort to accommodate his eyes to the candlelight.

"The door," said Lena. "Somebody's there. I'm sorry I burned you, but you wouldn't waken."

He muttered something about his head and took the candle from her fingers to light his way to the bar counter. She heard him clattering among bottles and swearing when he found them empty. It was on the tip of her tongue to bawl him out for wanting a drink when there was someone, an impossible someone, tearing at the debris outside the door. But she knew from experience what

one drink can do to smooth a hangover and get the wits working again.

"Get the gun while you're at it," she advised.

Sam weaved towards her with the candle in one hand and an empty bottle in the other. His lips were wet. "The gun's in my pocket," he said. "What did you do with the shells?"

Lena looked dismayed. "They were thrown into the far corner. Among the rubble. Give me the candle. I'll look."

"Waste of time. This'll have to do." Sam hefted the bottle and hoped his injured shoulder would stay as quiet as it was now and not incapacitate him.

Until then the noise had been muffled and filtered as it came through brick and lime, wood and lead. Suddenly a pencil of sunlight skewered the darkness and the sound was naked. As quick as the sunbeam had appeared it was extinguished. Someone was blocking the hole in the masonry; someone who was

trying desperately to enlarge the opening he had made.

Lena took Sam's arm. "Who is it?" she asked.

"It's not Santa Claus."

"Is it—they? Harry's crowd?"

"Who else? Let's get across to the door. We can surprise them there."

"No, Sam. That's asking for trouble. If we stay put and don't resist, maybe they won't do anything to us."

The sunlight was making its reappearance. It came and went, came and went. Each time it splashed into the bar, the hole at the door was bigger and the shaft of light was wider.

"We're dead ducks anyhow," gritted Sam. "The Creep must be pouring into this place. They're not going to watch me die slowly." He snuffed the candle and pulled Lena with him towards the doorway.

They stopped within six feet of it when they saw a hand curl into the hole and grasp a zigzag block of

bricks. With its protective gauntlet the hand was big as a boxing glove. As silently as possible they crept into the corner of the bar, between the end of the counter and the doorway.

There was a loud grating noise and the block of mortared bricks swivelled out of the sandwich of wood and cement. As if a keystone had been removed, the complete doorway collapsed in a grinding, thundering rumble and the bar was bright with daylight.

Unable to see outside from their position, Sam and Lena looked at the shadows on the floor. One edge of the pool of sunlight was jagged with the intrusion of the side of the broken wall. The other edge was clean, a straight line at first sight, but the arc of a great circle on longer examination. In the centre of the pool was the shadow of a big, mis-shapen figure. The shadow was motionless for a moment, legs wide apart in imitation of the figure in the

doorway, black and menacing. Then the shadow moved further into the bar, further, until the low-hung morning sun pushed the head and shoulders up the wall at the far end. The figure stopped with its back to Sam and Lena.

Lena couldn't see any weapon in the gloved hands or on the bulging belt round the bloated figure. Sam had noticed the same lack of armament and was lifting the hand with the bottle and tip-toeing out of the corner, keeping an eye on the doorway to see if anyone else was coming.

His foot crunched on rubble. He froze like a statue. Too late. One playful pebble of cement tumbled its way down a heap of debris, found a flat door panel to dance across with tip-tap jitter and ended up by rattling round the circular hollow of an up-turned stool.

The heavily suited figure didn't turn.

Sam's breath sighed out. The sound of the pebble had

not been heard through the bulbous protective helmet. He wondered if the bottle would make any effect on the helmet. Maybe if he picked his spot—the place where the helmet joined the thick suit at the neck——

He swung the bottle; and the bulky figure collapsed slowly at his feet.

Lena ran from hiding. She peeked quickly round the side of the doorway. "Hurry, Sam," she urged. "Before someone else comes." Sam made no move and she went back to him. He was staring disbelievingly at the prone figure.

"I didn't touch him yet," he said. "He fell before I hit him. He must have been hurt before he came in."

"Or the Creep?"

"Through that suit? If it was strong enough to get through that outfit we wouldn't be alive to see him drop. There's something funny about him that I don't get." He studied the prone figure—about five-ten without the helmet and the thick-soled

boots; not nearly so big as he looked with the pneumatic suit. The appearance of the suit started a train of thought in Sam's mind. He flicked his eyes to the long curve of the sunlight on the floor, then to the doorway. With quick decisive steps he went outside to confirm his sudden suspicion.

Lena had looked round the wrong side of the opening and had missed it. How she could possibly have missed it annoyed her when she answered Sam's sudden call and followed him into the daylight.

No bomb had blasted Harry's bar. The building had collapsed beneath the weight of an immense metallic globe, which, if it had landed squarely on the bar, would have flattened it completely. The buildings at the opposite side of the street had taken the full weight of the globe. From high above the doorway, where the side of the sphere had hit the bar, the curving metal convexed downwards to meet the ground at the other

side of the street. Looking down the road into the sun, the whole area seemed to be filled with the dull, glinting bulk of the metal monster.

"It's one of the things from the sky," said Lena superfluously. And as she thought of the implications, she added: "We've been invaded."

Sam agreed. "I named the wrong enemy."

"You did say they were space-buzzards."

"I know, but I didn't expect them to come down so soon. D'you realise what this means? There weren't enough spheres to launch a winning attack while our armies were still alive. The world must be helpless, stripped of its resistance by the Creep."

Lena was doubtful. "It doesn't seem possible. We two aren't dead. I don't feel even the slightest twinge of sickness. And it's so peaceful, such a lovely morning—just like a Sunday. The sky's blue, the sun's bright and

warm, the birds are chirping and——”

“What was that?” Sam pulled her up. “Birds? Where?”

“Well, one bird. Look, over there in the gutter picking up crumbs. Oh, it’s gone!”

Sam said: “I didn’t see any bird.”

“But there was one. I saw it.”

“You’re clutching at straws. You only thought you saw it, Lena. By the grace of God and the protection of a few inches of lead, you and I are still here to enjoy the sunshine. But birds? No! Nothing that spent the night in the open could still be moving. The very Sunday-like atmosphere is proof.”

He went inside the bar again and Lena followed him, asking: “What are you going to do?”

“I’m going to have a look at that alien. I was born curious. And I’m going to peel that suit off him. It may not fit you very well, but it may save you from the Creep—if it isn’t too late.”

“I don’t want it,” said Lena. “What’s the point in being alive if you’re alone?”

“You could go underground. There’ll be someone somewhere.”

“And watch them die while I survive to solitude? No, Sam. I’d rather go outside and sit in the sun to wait for the end. But I can’t even do that, because I don’t know when more like *him* are going to come out of that sphere.”

Sam was dragging the alien into the open. He grunted: “They’ve probably split up and gone exploring. This one picked our grave. The rest will be busy with other morgues.”

Womanlike, Lena’s thoughts darted obliquely. “Why did he pass out? Is he dead?”

“That’s what I’m going to find out,” said Sam. He was searching for the fastenings of the suit. Lena nervously edged close and tried to peer through the transparent faceplate of the metal helmet. The clear plastic was frothed with blood. Red blood. But there was one

unobscured area through which she could see the alien's face.

"It's a man!" she cried.

"What did you expect? A scaly, three-eyed monster?"

"But you said they were scavengers. He's human."

"Well?"

"Oh, don't be so damned cynical, Sam! You've spent so much of your life among the strong and the crooked you've forgotten about the meek and the mild. Heaven knows, I haven't associated with them too much myself, but there are some decent people. Humans aren't all rotten."

"Maybe so. But the strong rule the weak and the world's a rotten place in consequence. Now let me get on with it. The sooner you get this suit on the better."

"I don't want it. I mean that. I don't want it."

"Afraid of the blood?"

Lena's face was grim, her pale eyes staring coldly at Sam. "Leave him," she said. "Leave him and listen to

me for a moment. You had your say yesterday morning and I'm not sure now that you had your facts right."

Amusement lifted Sam's lip. "Carry on, I'm listening."

"There was a bird out there a minute ago. Whether you believe me or not, there was one." Where a bird can go without protection I can go. I think the Creep has disappeared, or else it has reached its peak and started receding. How that could happen is beyond my knowledge. As you say, it was coming from the atomic tests. But when it reached a lethal level, it must have done so nearer the test sites than anywhere else. And when that happened, then the tests would have stopped and the radiation level would have started to drop."

Sam scoffed. "There's an answer to that one—the fallout from the earlier tests will go on for a long time yet."

Lena was undaunted. "If I knew more about it, I could probably think up a dozen

reasons why the Creep is dropping, and you could probably knock down every argument. But you wouldn't shake my faith. I heard that bird, Sam. Just because it's quiet doesn't have to imply that everybody is dead. You know as well as I do that in any street in the world there are few people who dare to stay on the surface for very long. Especially after your broadcast."

She waited to see if Sam would argue. He was watching her with one eyebrow lowered in concentration and the other raised in conjecture. When she saw that he wasn't going to interrupt, she continued:

"That bird I heard means you were wrong about the Creep. You could be wrong about the spheres, too. The aliens aren't necessarily scavengers and buzzards. Until we're sure this one means us harm you're not taking off the suit. He needs it more than I do."

Sam told her: "All right, so that's your opinion. You

think the aliens are angels and that we've got a new lease of life. I think we're dying already, so if you want to gamble on coming face to face with an alien who isn't half-dead like this one, I'll play it your way. There's nothing to lose. But tell me, if the Creep has gone why be so concerned about letting Joseph keep his coat?"

"Because," said Lena triumphantly, "he may be human, but that doesn't mean he breathes oxygen. That's a spacesuit, not an antigamma suit. The belt that looks like a tyre is his gas tank."

"Then it would be kinder to kill him now than let him die of asphyxiation when the tank is empty."

Lena said: "I know that," and looked him in the eye pointedly.

In the short while he had known her, Sam believed he had fitted her into his inventory of familiar characters. He looked at her as if he had never seen her before. "You want me to take him into the

sphere where he can breathe his own atmosphere? You're crazy!"

"There's nothing to lose. Remember?"

Sam had no get-out. He accepted defeat and stood up from the alien's side. He said: "You don't mind, do you, if I just make sure first that the sphere is really empty? And since you're so stricken with brotherly love, you can keep watch over Joseph while I look."

Lena lifted her chin defiantly. "Go ahead, I'll wait."

There was still no sign of life in the street when Sam went outside. His search for an opening in the smooth wall of the sphere took him as far as the corner of the block. From there he scanned the metal globe, stretching on tiptoes and craning his head backwards. He could just see over the curve to the top of the sphere. There was no porthole to be seen on that side.

He came back to the bar and walked through the space

between the alien machine and the wall of the building. He found the other half of the sphere as blank as the first. Sam rubbed his stubbled chin in thought. It was possible that the alien had closed the port behind him and, if it was close-fitting, it would be difficult to find unless its position was known. The more he thought of it, the more Sam believed that was the reason for the apparent absence of a doorway. He shrugged his shoulders and decided to give up the search. He expected Lena would harangue him for giving up so easily and began to build an excuse out of what he knew about airlocks and the necessity of sealing the other half of a double door.

A triple-toned whistle wrecked the edifice of his excuse before the foundation was laid. Sam stopped in his tracks and lifted his head to listen. The whistle sounded again—a fast open fifth and the tonic note repeated; a simple cheeky tune and the

sweetest music he had ever heard. It seemed to come from the remains of the building at the other side of the street, the building which had taken the brunt of the sphere's impact.

Nature study had never been one of Sam's favourite hobbies, but he recognised the cheep of a sparrow. Or was it only the result of Lena's insistence, he wondered. Was it auto-suggestion or imagination? There was only one way to find out. He crossed the brick-strewn street and clambered up the remains of the ruined building. If he could see the sparrow, then he would believe it existed.

The belly of the sphere had completely crushed the building at the point of contact and mounds of brick and rubble were heaped round the dull metal flanks. It was one of these mounds which Sam climbed. He slipped and fell quite often. It was difficult to find a firm footing when he couldn't tell what was part of a wall still standing and what

was upflung debris. With time, persistence and much swearing, he finally got to the top—and immediately saw a mistake he had made; almost as much of the sphere's bulk projected over the other side of the battered building as there was to be seen in the street.

From the mangled steel furniture that littered the top of the mound, Sam judged that he stood on what had been a block of offices. He hoped there had been nobody working late the previous night, as he edged his way round the sphere.

At the rear of the globe—which he hadn't been able to see from the street—he found two metal bars which curved from where he stood, up and over the surface of the sphere. He didn't need more than one try to guess that here was a ladder leading up to a port-hole. But it was a ladder without rungs—unless two crossbars, set about five feet apart, counted as rungs. He put his feet on the lower crossbar and wondered if he

could get sufficient purchase on the cold, smooth, parallel bars to climb to the top of the machine.

He took the upper crossbar in his hands and pulled himself up. His toes were still on the lower rung when he noticed that the bar in front of his eyes had a faint line round its middle and was ridged as if to give a better grip.

He stepped back on the rubble. Unless he was mistaken, the upper crossbar was in two halves and these were intended to be turned. He rotated the left half gently. Nothing happened and he tried the other half. Immediately he felt the bar kick slightly. He looked down into the street. Trying not to think about how far he would have to fall, he stepped on the footbar and twisted the right half of the handbar firmly.

With the beautiful fluidity of superb machinery, the two rungs slid up the sides of the power ladder and carried Sam to the top of the

sphere. The motion of the rungs was differential and instead of jamming to a halt abruptly, they slowed gently and stopped at the rim of an open, yard-wide circular port.

Concealed lighting bathed a bathroom-sized chamber. Most of the floor of the small chamber consisted of another round port. This, too, was open. Sam was puzzled—either the alien had left in a hurry and had been careless, or else he hadn't intended returning to his ship. With a look of prayer at the blue sky, Sam swung a leg and climbed into the upper chamber.

It was a bare metal-walled room, with nothing to claim his interest. He waited until he was sure the sound of his entry hadn't roused any occupants of the sphere. Then he lowered himself through the second port and down a conventional ladder into the inner chamber.

This was more like his conception of the inside of a spaceship. There was the

resilient solidity of hydraulically sprung bucket-seats, the watchmaker's nightmare of serried dials. Even the milky globe of crystal wasn't too difficult to place as some sort of television receiver.

Only nine things spoiled the picture. One was the silence, the absence of the expected hum of machinery. The other eight things were the corpses in the bucket-seats.

Sam didn't waste time inside the ship. He took a quick, wary peek through two doors leading out of the chamber, saw nothing but the dark gleam of alien machinery and made his way back to the world he knew.

As soon as he popped his head into the open a startled movement caught his eye. A bird flaked up from the slates and bricks. Sam got out quickly and stood where the bird had been, watching it glide out and down into the street. As it hopped along, he kept changing his position so as not to lose sight of the bird. His eyes were greedy for this

one sign that the Creep had vanished.

He could see Lena down at the door of the bar. He waved and pointed. She was out of line of sight with the bird. He shouted: "The sparrow!" But his voice was blown away by the morning breeze. Lena understood, however. She danced a little jig, then gestured him to hurry down from his lofty perch. He waved again. "In a minute," he yelled and returned to his bird-watching.

Apart from the rubble, the street was comparatively clean. Few people had been about for days and the sparrow was finding very lean pickings. It hopped further and further along the street and Sam had to shade his eyes to keep it in sight.

He inhaled deep. It was good to be alive on a day like this. Real good. Clear blue sky, peace, silence and no Creep. He laughed a little. He had almost forgotten what it was like to enjoy these things. And all due to a

little sparrow hunting for his breakfast!

Sam was as far along the ruined block of buildings as he could get, and still the bird was skipping further down the street. Quite suddenly, when it wasn't far from the hospital he had intended taking Gibb to, the sparrow stopped. It had found a morsel, Sam assumed. But when minutes passed and the sparrow remained motionless, he frowned. He waited a little longer before risking his neck on the downward climb.

His frown was a deep, thoughtful scowl when Lena saw him enter the bar again. "It was empty?" she asked, and he couldn't think what she meant. "The ship," she said. "Is it safe to take him inside it?"

"Your sparrow's dead," answered Sam.

Lena put a hand to her throat. "Dead? But you looked so excited up there that I thought you had seen it—alive."

"It was. Until it wandered

too far from the sphere. When it got about forty yards down the street it stopped. And it hasn't moved since. The Creep hasn't gone, Lena. Something inside that spaceship has cleared out a zone about eighty to a hundred yards in diameter and mopped up all the gammas. Outside that zone the Creep still exists, intense enough to kill a little bird immediately it left the safety zone."

Lena asked: "You're sure it's dead?" Sam's grim expression gave her the answer, and she said: "What do we do now?"

"If you know any prayers," replied Sam, "this is the time to get down on your knees. Pray that somewhere in an area of roughly eight thousand square yards we can find a doctor, or a nurse, or anybody qualified to keep Joseph alive. He mustn't die."

"That's not what you said before."

"I didn't know then that the aliens had a whatsit for neutralising gamma radiation.

If the citizenry stay in their holes long enough, and we can get Joseph patched up before the Creep gets underground, there's a chance that we might"—he curled his lip at the phrase—"that we might save the world. It's obvious now why we're still alive, but we may not be so lucky if the neutraliser stops working, as it could do." He told her of the chambers open to the air and of the dead alien crew.

Lena looked down at the unmoving figure on the floor of the bar. "We don't even know if he's alive. He hasn't twitched a muscle since you went out."

"That's something else to pray for. We'll have to leave him anyhow while we scour the safety zone. Two of us will cover the streets quicker than one could."

They started with the street where the sparrow lay. Lena took one side. Sam took the other and counted his paces to get a measure of the limits of the safe area. While

he contented himself with peering through house windows, Lena was more thorough and rang every doorbell on her side of the street. Sam was waiting a cautious ten yards from the bird when she caught up with him.

"Oh, the poor little thing!" she cried, and darted forward.

Sam yelled: "You bloody fool!" and dived at her legs in a flying tackle, bringing her down with a slam that punched the breath out of her. He picked her up and carried her away from the dead sparrow. When he set her down roughly, she rubbed her ribs and said: "I'm sorry. That was stupid of me. I didn't think."

Grudgingly, Sam said: "I'm sorry, too, if I hurt you. But you saw what happened to the sparrow. It must have dropped in its tracks the instant the Creep hit it. The level must be blistering high."

The luck which had ordained that they should survive the Creep through the influence of the alien space-

ship stayed with them. Harry's bar was located in a none too salubrious quarter, and the odds against finding a doctor's surgery in the vicinity were high. The odds against finding one where the doctor was at home were frightening. But their luck held.

Lena discovered the house with the brass plate on the railings outside. They had directed their search to the west of the sphere, away from the sparrow, and they had gone almost as far along one of the better-class streets as Sam dared. He ran across the street in answer to her summons.

He looked at the brass plate doubtfully. Sometime, some long ago sometime, the plate had been polished with pride and regularity so that the embossed lettering was all but lost in the worn brass. From the various shades of bronze overlying the letters it was apparent that the polishing of the plate had been neglected for years. The smaller letters, reading M.B.,

Ch.B., were the easiest to decipher. It was only with difficulty that they made out the doctor's name above the initials.

Lena rang the doorbell and waited with crossed fingers and closed eyes. When the door creaked open in response to her third ring, she didn't dare open her eyes until a voice wheezed: "Well?"

"Thank God," she sighed. She asked the old man at the door: "Doctor Sullevan? Doctor Frank M. Sullevan?"

The eyes looking into hers sagged in their lower lids with the weight of past sorrows. A lot of white—yellow-white—was visible above the irises. The eyes flicked nervously and warily.

"I'm Sullevan," the old man admitted. He made an effort to tidy his stained, rumpled suit, and combed his straggly white hair with grimy fingers. "What is it? I don't practise now, you know. Not since——" His voice tailed off in reverie.

"You practised once," said

Sam. "Things like that are never forgotten. And this is urgent." He told Sullivan about the unconscious alien back in the bar; but for the moment he didn't reveal that the injured man was alien. "Pick up your bag of tricks," he ordered. "There's no time to lose."

The old man was afraid. "I can't do it. It's been too long. I haven't the stuff now. No antibiotics or sulphas. Nothing."

"I thought improvisation was a medical man's strong point," said Sam. "You must have some drugs about the house."

Sullivan tried to get inside and shut the door. Sam's foot blocked the opening and his good shoulder thrust the door wide again. "I can't do it, I told you," said Sullivan. "You're trying to trap me. You know I haven't a licence. Go away. Leave me alone."

Lena intervened. She said: "Doctor Sullivan," stressing the title. "We're not from the

medical board or anything like that. We don't know a thing about your past. All we want you to do is to come and help a man." She eyed Sam and decided to use her own approach. "This man isn't from Earth, doctor. Heaven knows how long you've been cooped up here like a hermit, but you must have heard about the spheres and the Creep——"

"The Creep," repeated Sullivan, parrot-fashion.

Lena took the old man's filthy hands in her own. "Try to understand," she said. "It's important that this man doesn't die. Very important. You must help as best you can."

Sullivan struggled in the vice of circumstances. "I can't," he repeated. "I wish I could, to please you, but I'm sick myself. And it's been too long. From this gentleman's description it sounds as if a major operation is necessary. My hands are gone. The skill's gone."

"And your nerve's gone," added Sam.

The old man didn't deny it. He tried to back away again. "I'm sorry," he said. "Try somebody else."

"You're the only one," pleaded Lena. "Can't you make him understand, Sam?"

"With my boot I would if he wasn't so old. He's a lush. Been hitting the bottle for years—hey! Maybe that'll work." Sam took hold of the stained lapels of the doctor's coat. He growled: "Listen, Sullivan. How would you like it if I came inside and smashed every bottle in the place? You wouldn't want me to do that, would you? Well, that's exactly what I'm going to do unless you get your things and come with us right away." He pushed Sullivan from him with an emphatic gesture.

"I'm waiting," he added grimly.

The old man's eyes found Lena's again, but in spite of her sympathy, she returned his stare coldly and ignored the pleading in it. He looked

as if he might start crying. He held his hands in front of his face and his slack cheeks twitched in synchronisation with the trembling of his fingers. He put his hands behind his back.

"Bring him here," he said, in a voice brittle with fragile decision. "Bring him here and I'll do what I can."

"And find the door barricaded in our faces?" asked Sam. "We're not leaving here without you."

Sullivan squared his narrow shoulders. "I've given my word," he said. His voice had a pathetic dignity. "The facilities here are not much, but they are better than the floor of a bar-room. You fetch the alien and I'll be ready."

When the surgery door was opened to them a second time, it seemed to Sam and Lena that Sullivan's place had been taken by a stranger. He had discarded his coat and had changed into a reasonably clean shirt. His face and hands were scrubbed and his hair had been regimented into

order. Gone from his eyes was the somnolent dejection; they shone bright with eager confidence. But the greatest change was in his manner.

"Into the back room," he said briskly. "There's a table prepared.

Sam followed Sullivan with his burden—a surprisingly light burden considering the cumbersome spacesuit. His own injury hadn't bothered him since waking, and he surmised that the wound was clean and beginning to heal.

"Wash your hands in the basin," the old man ordered. "Both of you. And be ready to help if I should ask you to. The instruments on the tray shouldn't be too difficult to recognise. When I call for one, dip it in this jar of alcohol before handing it over. It's the best I can arrange in the way of sterilisation; there's no current to boil water by."

He bent over the alien and gave a cursory glance through the blood-spattered visor. "Mmm——" he said. "Awk-

ward." Yet he didn't sound too pessimistic. Instead, he appeared to relish the fact that his task was going to be difficult. "Half the ribs broken, if nothing worse," he intoned to himself. "Very awkward."

Lena asked: "Can you set his bones without taking the suit off?"

"Possibly. But I might kill him in the process, and there might be complications which I can't diagnose until he is stripped. If it is at all possible, I must have him stripped. Otherwise—then I shall have to risk working from the outside and hope his lungs aren't punctured."

"How——?" began Lena.

Sullivan silenced her with a gesture to signify that he was too busy to answer questions. Although he could not possibly have encountered an alien patient before, he set to work with a business-like sureness that staggered the others.

The fingers of his right hand curled familiarly round the barrel of a hypodermic

syringe. With his left hand, he thumbed a self-adhesive rubber patch on the sleeve of the spacesuit. He depressed the plunger of the hypo so that the barrel was empty of air and slid the needle into the centre of the rubber patch. Stringy muscles ridged his thin wrist as he forced the needle through the tough material of the suit.

There was a quick jerk and the suit was pierced. But with practised skill, Sullivan halted the needle's progress before it reached the man inside the suit. He changed hands on the barrel of the syringe and drew out the plunger slowly. Another steady pull and the needle was in sight again. Sullivan glanced briefly at the empty barrel, held the needle below his nose and pressed the plunger.

"Sweaty," he commented. "But not noxious."

"Well, dammit," Sam admired. "You've got guts! And brains, too. That self-seal idea was real cute."

The old man didn't hear him. He was already drawing more gas from the suit. "The pyrogallol," he said, over his shoulder.

Engrossed in the procedure, Sam and Lena were slow in responding. "It's in the old photographic kit; the black cardboard box. That's right. Now shake a few crystals into one of the glass measures. Half fill the glass with water—don't gush it in! Run the water down the side of the glass. Can you see another bottle, marked SODIUM CARBONATE? Right—take out one little lump. Drop it in the water and bring me the glass."

Sullivan took the glass and held it to the light from the window. The solution was pale, straw-coloured. He dipped the syringe gently into the water until the needle rested on the few undissolved feathery crystals of pyrogallol and emptied the gas from the suit into the solution. As the bubbles trickled from the needle, the straw colour

changed to a rusty brown and the doctor seemed pleased with the result.

Afraid to interrupt Sullivan, Lena asked Sam: "What was all that about?"

"A test for oxygen. It must be a long time since the old boy did any photography. And just as well—they don't use pyro as a reducing agent any more. That was a positive reaction he got, incidentally."

The old man handed the glass and syringe into Lena's hands without so much as looking at her. He was back in harness and anybody standing around was there only to give and receive articles as he required. A trifle imperiously, he said: "Sphygmomanometer next."

Sam knew that one. He handed over the instrument with its bulb, rubber tubing and mercury scale. The doctor whipped the flat tubing round the arm of the suit where it ballooned most, and began pumping the rubber bulb. When the inflated sleeve col-

lapsed under the tubing, he unwound the rubber, wrapped it around the rest of the instrument and walked over to the window. There he stood gazing up into the wedgewood sky, moving his lips as he calculated silently.

He turned and announced: "It's oxygen—at about sixteen pounds pressure. The suit can be removed without the risk of asphyxiating him." To Lena in particular, he added: "It will be messy from here on. Would you like to leave?" She declined his offer with a slight shake of her head.

It was more than messy. So much blood covered the alien's body that it seemed useless to hope he could still be alive. Yet the old man was quick to detect a faint heart-beat. With more doggedness than courage, Lena helped to wash the unconscious stranger. When the welter of blood was cleared and the savage chest wound was visible, only the urgency of the situation, the desperate need to keep the

alien alive, prevented her from fainting.

The alien's left pectoral was deeply indented, as if something had rammed him in the chest when his ship had landed. From his side, five white ribs protruded. These the old man studied with such great interest that Lena felt bound to remind him: "Please hurry. If you don't patch him up and bring him round soon, it'll be too late. In spite of the Creepmeters and Sam's warning, people could start coming up from underground any minute. Friend or foe, he must be made to tell us the secret of neutralising the radiation. If he dies, everybody will die. Like flies, or like sparrows, as soon as the anti-Creep hatches are lowered."

The old man picked on Sam as being the one more able to understand. He said: "Haste could defeat us. This man looks human and can breathe our atmosphere safely. But am I to deduce from these paltry facts that he will react to my

drugs as a human would?"

"Risk it," said Sam, curtly. "He doesn't look too different to me."

"No? Take a look at the rib fractures."

"Well?"

"Of course, you wouldn't know. You and I and the girl—our bones aren't hollow like his. The only creatures on Earth with hollow bones are birds. That's for lightness. And our friend here, naked as he is, couldn't weigh more than ninety pounds. Perhaps a light frame is the best for life under the prevailing gravity on his planet. Or perhaps his bones are hollow because he isn't quite human as we understand it. The choice is yours. I can't take the entire responsibility for filling him with drugs which might be safe enough for us, but antagonistic to his system."

Sam looked at Lena—so young, so vital, the greater part of her life still to be lived. He thought too of the unknown millions who would be digesting their breakfasts

and maybe getting ready to come up into the sunshine. He knew the little people well—Creep or no Creep, their world was on the surface of the Earth, not hundreds of feet below ground; sooner or later, certainly before the day was out, they would come poking their noses out of their holes.

He told Sullivan: "Do what has to be done."

There were no symptoms of shock when the old man injected the alien with morphine. The second syringe, lying ready with its load of adrenalin, was not needed for the moment. When he was sure the narcotic was effective, Sullivan made two deep incisions in the chest, laid back a triangular flap of tissue and studied the damaged bones. Two of the five broken ribs also had depressed fractures where they joined the sternum. These would have to be cut out completely. The others could be reset.

In grim silence, and under conditions in which no sane

doctor would have contemplated working, the old man cut and sawed and stitched. Once, his hand darted to the adrenalin syringe, but Sam and Lena didn't see him use it then, although he did later when he had nearly finished working on the alien.

Suddenly it was over and the old man walked abruptly from the table and slumped into a rickety cane chair. His hands were shaking violently.

"He should live," he answered the question in the others' eyes. "The operation has been successful. The rest depends on whether or not he succumbs to sepsis. I don't think any of us would survive, but he might."

Sam asked: "What makes you think so?"

"He has two hearts. One was stopped, damaged by the blow that fractured his ribs. I set it going again with adrenalin before I sewed him up. With two pumps working, he should be able to filter

out any bugs which have drifted into his blood."

"Even bugs his cells have never met before?" queried Sam. "Even Earth-bugs?"

"I'd say he was a rather indestructible character and leave it at that."

Lena congratulated him. "You've been wonderful, Doctor Sullivan. And I don't think anyone else could have done the job so well." Her gaze took in the dirty, unkept room. "Whatever has happened since you stopped practising, you must have been among the best at one time."

The old man was deeply touched. He reached across to the table for the morphine syringe. "Thank you, my dear," he whispered, with tears making his eyes old and rheumy again. "You make me feel good and strong."

He swabbed his forearm with alcohol and added in a husky whisper: "But not strong enough."

"Please don't——" began Lena. Sam caught her eye and shook his head. They

made a great pretence of watching the alien and in a while they heard Sullivan leaving the room.

Even when they heard the front door open and close, Sam restrained Lena from calling after the old man. In the silence that followed the fading of the old man's footsteps, Sam said: "I think he knew what he was doing."

While they waited for the alien to recover consciousness, Lena scrounged round the kitchen and found some milk. There was no food in the house, and several cups of cold, half-sour milk had to suffice as their first meal since the previous night.

As so often happens, even with ordinary patients, the alien's awakening was surprisingly soon in coming. Until he opened his eyes he had been deathly pale. When he rolled his head on the makeshift pillow and blinked twice before fixing his stare on Lena, life and colour flowed back into his cheeks, and it was Lena who was suddenly pale.

"He's come to," she whispered.

Apart from a blanket over his legs and the strapping round his chest, the alien was naked. Sam remarked on this. "He can't do much harm the way he is now. All the same, remember we don't know whether he's pally or not. Probably not. He didn't come to Earth for nothing. He turned up at a time when Earth was helpless, and I don't believe in coincidences like that."

The alien was raising himself to a sitting position; and without too much difficulty, for he was a strong, wiry-muscled specimen. With his bare chest, long tousled hair and the sarong-like blanket he looked as if he had stepped from a Hollywood jungle. Lena expected him to thump his ribs and grunt, "Me—Tarzan!" She giggled.

Under Sam's brooding scowl, she sobered and did a womanly thing. She took a cup of milk to the alien.

He glanced speculatively

at the cup which Sam still held and emptied his own at a gulp. He held the cup out to Lena and she refilled it. "Cup," she said, tapping the thick crockery. She pointed to the white fluid: "Milk . . . Cup—of—milk."

Sam snorted. "Semantics as she is semanted!"

"We've got to start with something," Lena defended herself. "How would you do it, smartie?"

Sam admitted: "I never thought of it." He paced the floor, stopping in front of her. "It's hopeless. You know that? We've got a few hours, if that much, to build a language we can all understand; and then we've got to convince Joseph there's a good case for calling the rest of the spheres down to kill the Creep—instead of killing us."

"Look at him," said Lena. "What is there about him that strikes you? What's the difference between him and any other man? And I don't mean his two hearts."

"There's no difference I can see," Sam answered, after a moment's consideration. "What is it?"

"That's it. Nothing! If we had walked into this room right now, if we hadn't seen him opened up, we couldn't tell he wasn't as human as we are."

"So?"

"Don't you see, Sam? He's alien, yet he's human. As human as we are. But have we got spaceflight? We haven't had a successful moonflight yet. And he's come from another galaxy! Physically, he is almost at the same stage of development as Terrans are, maybe a little ahead, but not enough to make him too—well, too alien. His mind should be on a par with his body."

Sam whistled. "You mean a high I.Q. specimen? Quick on the uptake and able to learn English in five minutes? Could be. But which of us is able to keep pace with the teaching?"

"Me," said Lena. "There

was a time, before I became a model among other things, when I taught school. Don't look so sceptical, it's true. I've educated infants. He should be easy. I can at least try."

"It would take years, which we haven't got."

"Not if he's super-intelligent. I'll begin with onomatopoeic words. All language is based on imitative sounds."

She picked up a spoon and a drinking glass. Holding them in front of the alien, she tapped the glass with the spoon and said: "Ting!"

The alien smiled, held out his empty cup and said: "Milk." Lena looked at Sam triumphantly. Sam didn't commit himself.

"Milk," repeated the alien, and while Lena fetched another bottle he tapped the glass with the spoon and smiled at some secret joke. When Lena returned, he pointed to the glass and said: "Cup?"

"Glass," Lena corrected. "This is a cup. That's a glass.

Sam—it's going to be all right."

"Sure," said Sam, dolefully. "And too late. We might just as well have left him to die in the bar. Do you realise it's nearly noon? The slaughter will be well under way. Pack it up, Lena. It will take too long to educate Joseph."

"Let me at least try."

"What for? So that he can say 'Excuse please' in English while he cuts your throat?"

"Sam! Don't be so gloomy. Look at him—he's nice."

"I can name a dozen murderers from the last few years who have been presentable. Most of them killed only one person; Joseph and his buddies are after the lot."

Lena tightened her lips. "When I've taught him our language and he speaks, that will be soon enough for me to judge him. As for saying it's too late, that's nonsense. Some will die today. A lot will die. But by their dying, those who are not so foolhardy and who remain under-

ground will learn to stay where they are until they get further signs that the Creep is waning."

Sam was equally determined. "Much as my good sense tells me to slip a scalpel into his double heart, I'll stay my hand until you untie the semantic knot. But only so that he'll understand me when I tell him to order his brethren to blot up the Creep and then scam."

"If he should refuse?"

"He's a dead alien."

For ten minutes, Lena rattled cups, glasses, trays, and said: "Clang! Ting! Clash!" She sloshed water into the sink and said: "Water, wasser, whish!" She sniffed and said: "Sniff!" She gurgled and said: "Gurgle!" She whispered, whimpered, murmured, chuckled, and ran through all the other imitative words she could think of. And all through the ten minutes, the alien watched and listened with his head cocked to one side and a slight smile on his face. He made no response.

"Give up?" asked Sam.

"N-no. Not yet. But I never realised before how inadequate our language is. You can't get across more than about one word at a time; a simple three-word sentence at the most."

"Lena."

Her name was spoken in a deep, resonant singing voice—the voice of the alien. "Lena," he said again, and she went to his side like a sleep-walker.

In ten minutes, the alien had learned directly no more than twenty or thirty nouns, adjectives and expletives. He had picked up the meaning of about twice as many words by watching and listening to the general conversation. With this vocabulary of roughly a hundred words, he completely turned the tables on Lena. He taught her his own tongue. Less tortuous than English, it was also less colourful. In place of complexity it had straightforwardness. What it lacked in colour was more than made up for by its clarity. And in just over

thirty minutes there was nothing the alien could say which Sam and Lena could not understand. Even his explanation of the sphere's mechanics was lucid up to the point where their ignorance of things technical failed them.

They gathered that cosmic rays linked every star in the heavens. The rays, said the alien, were everywhere in space; but because of stellar magnetism there were concentrated channels of the rays between each and every sun, and weaker but detectable links between suns and planets. When these broad highways were there to be travelled, who would not wish to explore? Especially when it was relatively easy to build a sphere with a drive operating from the cosmic rays.

"Why come to Earth?" asked Sam.

"There was a highway," said the alien, as if that was sufficient explanation.

"Do you always drop in so clumsily?"

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The alien, who had given his name as Blon, looked grave. "You were responsible for the way I landed. Yet I will apologise. I'm sorry that I couldn't prevent the crash and the damage done."

"We were responsible!" Sam was sceptical and angry.

Blon elaborated. "Our detectors picked up an unusual radiation from your planet. Pending our analysis of the radiation, we circled your world several times. The rays activated our motors as cosmic rays do, and we had to use maximum shielding to prevent being dragged into your gravity. I decided to make a low-level survey of the planet. You can guess what happened. I lost eight men, my entire crew, in the crash. I was lucky not to be killed myself."

"This radiation," said Sam. "The one that made you crash—what does your ship do that neutralises the radiation?"

"What he means," Lena explained to the alien, "is

that the radiation is lethal. We would like to know if your ship is responsible for the radiation-free zone around it. And, if so, can you use your other ships to clear the entire Earth?"

"Was the radiation intended to destroy our ships?"

Lena shook her tow-coloured curls. "To destroy ourselves," she said contemptuously.

"Watch your tongue," Sam warned, in English.

"It's got to be the truth," she said. "Nothing else will do. Oh, I know I sneered when you said you had told the truth in your broadcast yesterday, but this is different. I'm pleading for our only chance of survival. Any time I did wrong when I was a kid, I always found it best to go and admit the fact to my parents before they found out in their own way."

She laid the plight of terrestrial humanity before the alien. She kept back nothing. She told the whole story of men's greed for profit,

greed for property, greed for territory, and the foulest greed of all—the desire to possess the very souls of other human beings. She gave Blon a complete background to the picture of the present day when she related that since the opening of the twentieth century there had been only six months during which there was not a war being fought somewhere in the world. At the moment, she admitted, there was peace. But it was peace in the shadow of death, unsavoury peace in the invisible shroud of the Creep. And the Creep itself was only the result of man's latest attempt to build a weapon which would ensure him a greater share of the world and its wealth than his neighbour possessed.

"That's the kind of world this is," she said. "You're in the fortunate position of being able to take it or leave it. We have to take it. That's why we're begging your help."

She could see the indecision on the alien's face and her

heart raced with fear. Yet she refused to make any excuses.

"You are like that?" asked Blon. "You've saved my life without being asked and now you plead unselfishly for the lives of millions."

Lena tasted her bitterness to the end. "I'm just as selfish. Unless you lived we couldn't have your help. Without your help the human race on Earth dies. And I'm part of it."

The alien considered. "Why should I help? I've walked into a situation which I didn't create. That situation has caused me a lot of grief. Our ships came here in peace, as yours might have done to another world if you had possessed spaceflight. We sought no conquests. Simply because you can't live with each other in real peace, simply because your search for weapons has fouled the air with radiations, my ship crashed. Yet you ask me to save you?"

Blon put his legs over the edge of the table and stood

up. "Help me to the door," he said. "Let me see this world of yours again."

With the sunshine in his face, he continued: "I won't deny that I could help. My ship could absorb the radiation through its shields, convert it to another form of energy and redirect it into space, or into the core of your Earth. With the assistance of my friends' ships, your whole world could be made clean again. But to what purpose? Wouldn't the same thing happen all over again?"

Lena was earnest. "No, Blon, not again. I'm sure a lesson like this will be remembered."

"Perhaps," said the alien. "And perhaps not. The question is—should you be given the chance? From what I've seen, Terrans are tolerable as individuals, but madmen to be avoided in the mass; which doesn't surprise me—my own race is human, and our history is similar to yours in

pattern, but not in the intensity of violence. Incompatibility would appear to be a human failing."

"It's teachers we need," said Lena. "People like Sam, who could hammer home the lesson of the Creep."

The alien faced her squarely. "I could do the same thing," he said, and his face was so stern that Lena's head drooped in despair.

"By letting us suffer for our sins?" she whispered.

"That isn't what I meant," Blon corrected quietly. "I could help in the same way as Sam could. And apart from the example of the Creep, I could tell them of another example—my own planet. You see, my friends and I, we're political refugees."

Lena hardly dared to ask: "Then?"

"Then," said the alien, breathing deep in the mid-day breeze, "if Sam will be kind enough to carry me back to my ship——"

Book Reviews

FICTION

FIRST LENSMAN, by Edward E. Smith, Ph.D., published by Messrs. T. V. Bordman & Co., Ltd., 14 Cockspur Street, S.W.1, at 9s. 6d., is the second of the Lensman series of which *Triplanetary* was the first.

It is unashamed space opera of the most blatant type, with lily-white heroes and tar-black villains engaged in a conflict, the extent of which staggers the imagination. It is set in a period when fleets of spaceships travel constantly between the stars, and with the expansion of commerce the criminal element gets out of hand. So far do they get out of hand that it is only the discovery of the "Lens," the mysterious, unforgeable, indestructible identification of the newly-formed Galactic Patrol which gives honest men a fighting chance.

And the accent is on fighting.

The first lensman, Virgil Samms, gives the story its title, and with him you are transported to an assortment of worlds and meet an assortment of people which will leave you gasping.

It seems hard now, looking back on the period when the Lensman stories first saw the light of publication, that, at the time, they were regarded as the ultimate of their type. Tastes may have changed since then, and the series has been completely rewritten, but one thing is certain. If you like adventure, high wide and handsome, this book is for you.

THE MAN WITH ONLY ONE HEAD, by Densil Neve Barr, published by Messrs. Rich & Cowan, 178-202 Great Portland Street, W.1, at 9s. 6d., has a clever title, but that seems about all.

It is about a man who, of all the inhabitants of Earth, alone remains virile and able to father children. His name, oddly enough, is Vince Adams, and the story is not what he does with his unique gift, but rather what is done to him by an outraged world.

The book itself is infuriating in that the author doesn't seem to know what to do with his situation. It meanders from the central character into all sorts of odd situations, none of them really germane, and

too large a portion of the book is taken up with a dull "trial." Naturally, at the end, humanity recovers sufficient virility to perpetuate itself and the story is told in a confusing flash-back technique which, with the mingling of first and third person, muddles things even more.

It is a pity, because the writing is good, the plot could have been fruitful, and the extrapolations thought-provoking.

THE DEMIGODS, by Alfred Gordon Bennet, published by Messrs. Rich & Cowan, at 12s. 6d., is not a new book, but is one which has stood the test of time.

Its plot isn't new. Giant ants appear in Darkest Africa and, ruled by an Intelligence so vast as to be beyond human comprehension, plan to wipe out poor old Homo Sapiens, but the story is extremely well told and, if you can forget the impossibility of ants growing to incredible sizes, quite enjoyable.

G.O.G. 666, by John Taine, published also by Messrs. Rich & Cowan, at 10s. 6d., is written by a man who should know his medium better than most.

This story is about three

Soviet scientists who visit America on a good-will mission. With them, a supposedly willing laboratory guinea pig, is a shambling, brute-like creature who has been christened by his compatriots, and whose name forms the title of the book. As the story develops it becomes apparent that G.O.G. is not the stupid fool he appears to be and, at the ending, he turns out to be quite intelligent.

Unfortunately, the writer does not credit his readers with the same intelligence, and the plot, aside from being illogical, tends to become too obvious. However, this is a very readable book, turned out by an experienced writer of the medium. But it would have been a lot better had the writer not made his antagonists a combination of moron, genius and comic-book villain.

SHADOWS IN THE SUN, by Chad Oliver, published by Max Reinhardt, Ltd., 66 Chandos Place, W.C.2, at 9s. 6d., is one of those smooth, utterly readable productions which help to lift science fiction into a literary category equal to none.

While studying the cultural and social structure of a small Texas town, Paul Ellery

stumbles onto the fact that something is wrong. Just how wrong makes this an exciting and thoughtful novel, dealing as it does with anthropological and cultural patterns. To say more would be to spoil your enjoyment of the book—not to buy it would be to miss something worth having.

BRAIN WAVE, by Poul Anderson, published by Messrs. William Heinemann, 99, Great Russell Street, W.C.1, at 12s. 6d., also shows the hand of a man who is writing for the medium he loves.

This book deals with true science fiction in that it attempts to answer the question: "What would happen if . . . ?" In this case the writer postulates the theory that, suddenly, everyone, animals as well as humans, becomes more intelligent. Ordinary men and women become possessed with an I.Q. of 150 or more, morons begin to cogitate, animals have the intelligence of morons, and society almost breaks in the upheaval which follows.

The author has chosen to tell his story from various points of view, and the mosaic pattern does not help the book. In that, perhaps, it

just misses being one of the really great works of the medium, but even so it is to be recommended.

KEMLO AND THE STAR MEN, by E. C. Elliott, published by Thomas Nelson & Sons, Ltd., Parkside Works, Edinburgh 9, at 5s., is another of the series of the adventures of Kemlo and his friends.

This one is about weird voices, solid land inside a cloud of star dust, and the usual, extravagant adventures of the boys who live on the Satellite Belt K. For younger readers, for whom they are obviously intended, they will be acceptable, but for anyone who wants science in his stories and is not satisfied with fantasy, they will prove a disappointment. But do the younger readers worry about science?

COSTIGAN'S NEEDLE, by Jerry Sohl, published by Grayson & Grayson Ltd., 16 Maddox Street, W.1, at 10s. 6d., is another smooth effort by an American writer who knows how to handle words.

This story deals with parallel earths, reached via a machine, Costigan's Needle. This machine opens a portal to "somewhere" else and the first to pass through is G en

Basher of Inland Electronics. He doesn't return, and in the excitement which follows strange things happen. By stages, a group of people are collected who have passed through the needle and, after a long time, manage to rebuild their own machine with which they hope to return. The author has concentrated more on character than scientific gadgets, and the story is the better because of it.

NON-FICTION

TAKING COLOUR PHOTOGRAPHS, by George Ashton, published by The Fountain Press, 46-47 Chancery Lane, W.C.2, at 12s. 6d., is a book which anyone who is interested in the subject would be well advised to obtain.

Well and authoritatively written, with ample illustrations and colour plates, it covers the field of colour photography from a description of what colour is and how we see it, to the actual projection and viewing of the finished product. In reaching that end the author has explained technicalities, advised on choice of subject, dealt with exposure times, filters, and the processing of the exposed film itself.

MACH ONE, by Mike Lithgow, published by Panther Books, Hamilton & Co. (Stafford) Ltd., 30-32 Lancelot Place, S.W.7, at 2s., is the story of a brave man whose life has been spent with aircraft of all descriptions.

While this book contains no fiction, yet it reads far more excitingly than many a so-called adventure yarn. The author has actually lived the experiences he relates, and if at times they appear to be almost too fantastic for belief, that is only more proof that truth is often stranger than fiction. His experiences when flying as test pilot for Vickers Supermarine and the series of test flights and alterations of design leading up to the development of an aircraft which finally flew faster than sound, will enthral you with the realisation that, even now, men like the author are preparing for even faster, higher, more dangerous flights which will, ultimately, lead to space.

Profusely illustrated on art paper, this book is strongly recommended.

SOUND BARRIER, by Neville Duke and Edward Lanchbery, published again

by Panther Books, at 2s., is a book which anyone interested in aircraft or future rocket ships will want to read and possess to read again.

It is an introduction to the problems of flight in the transonic and supersonic regions. It deals with pressures, density of the atmosphere at various levels, and the temperature effects met with due to friction caused by high speed. It covers the design of engines, deals with jet, rocket-assisted, rocket and modern high-speed, high altitude aircraft of the present day and glances at future developments stemming from discoveries made while smashing the sound barrier.

This book also contains art paper photographs as well as many line drawings and, despite the technical subject with which it deals, is easily understood by the layman. No one interested in the problems to be met in the immediate future of aircraft and rocketry will want to miss this book. The sections on special gravity suits and acceleration problems alone will give you a clearer understanding of the problems still to be faced before we watch the spaceships take off for the moon.

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THE POLL

ONE OF THE INTERESTING things about running a poll is the replies obtained from the most unexpected places. This alone proves beyond doubt that *Authentic* is a truly international magazine and is read and enjoyed by people of all walks of life all over the world. This, while very gratifying, did have the effect of delaying the final compilation of results, but these results show that, while it is almost impossible to please all of the readers all of the time, we are managing to please all of them most of the time.

This, in itself, is quite an achievement.

The final breakdown shows that if most of you don't like a thing you regard your dislike as very important. For example, 80% of you who want more long stories regard this as very important indeed; almost as important as the 83% of those who feel the same way about short stories.

On the main issues the percentages were as follows: 48% want more space, time travel and psychological stories, and 45% want more science in the stories. How-

ever, while asking for more science, they insist that it shall be *science*, not fantasy.

Those wanting more non-fiction totalled about half of those wanting less, but 65% want more illustrations, while the battle between single and double columns remains a draw. Those wanting reprints of classics were in a minority together with those who want less projectiles, less book reviews, and those who want a "sales and wants" column. Only 2% want less science in the stories, and not many of you are interested in author's biographies.

All of the forms returned had certain items stressed as being of importance, and most of them carried suggestions which are most helpful. Quite a large percentage would like to see a "questions answered" column, but very few readers seem interested in American stories. The question of story-rating does not seem to be considered of prime importance and, aside from one author, you did not express any particular preference.

Modesty forbids me to name the author.

Discussions

100%?

I'm not going to waste time describing what I think of *Authentic*; let's just say that it's 100 per cent all the way through. I'd like to highly commend you on your reply to "No Padding" in *Projectiles*, 62. It's about time you hit back instead of taking everything lying down.

Keep up the good work.

John B. Tribick, 16c Glacis Site,
Gibraltar.

See Editorial.

SOME LIKE THEM . . .

I am a regular reader of your magazine and am glad to see that you are publishing more and more technical articles. This is what is wanted. More science and less fiction. So much of the science fiction we read today is 95 per cent fiction and only 5 per cent science. So many science fiction writers want to write before they have a 10 per cent knowledge of scientific matters.

One thing bothers me. In No. 4 of the series of articles on "The Way to the Planets," Dr. A. E. Roy, writing on the "Design of the Space Station," states: "Another unfounded belief is that, everything (in space) having no weight, girders and tanks will be easy to manoeuvre, but that is by no means so. Material will still have mass and, therefore, inertia, and a spaceman could still be crushed between two girders moving together, even though they are 'weightless'."

I am anxious to understand this. If these girders were weightless, how could they crush a spaceman?

What is the explanation of weight, mass and inertia, also density?

May I suggest a few articles for beginners in the study of the elements, atoms, atomic energy, etc.? And what about a regular monthly article on the subject of astronomy? Too many readers of science fiction have the most sketchy knowledge of astronomy and space travel.

I might as well come to the point. Why not publish a separate magazine, devoted entirely to the above? A popular technical science mag for the average layman?

H. C. Morgan, 37 Saron Row,
Ebbw Vale, Mon.

Thank you for a very interesting letter, Mr. Morgan. Answering your last question first, if we did publish a new magazine then it wouldn't be *Authentic*, would it? That means I'd lose you as a reader, and I'm selfish enough to want to keep you, and your letters, to myself. Also, as you must realise, the subjects you mention are too vast and complex for any short article to possibly do justice to them. All we can do is to introduce you to the fascinating world of science and, once interested, you will find many books which will explain and develop those fields to you. Many such books are reviewed in this magazine.

Also, you know, you aren't doing our authors, or readers, full justice. The science in our stories is as accurate as possible and will be more so in the future. Many people, even though they are not consciously aware of it, have learned a great deal of astronomy and the logical developments of space travel from the science in our stories. Think

about it for a moment and you'll agree that I'm right.

To understand the concept of "weightless girders" being able to crush a man, you must first get a clear idea of just what we mean by "weight." Weight is the result of fighting or impeding the pull of gravity. If you stand on a chair your body cannot follow the pull of gravity: it is supported by the chair. The result is that you are prevented from falling towards the centre of gravity and so feel the sensation we call weight. If you jump off the chair you are no longer prevented from falling and, until you hit the floor, are weightless.

But this sensation has nothing to do with mass and inertia. No matter where it is, the mass of an object remains the same. The higher the mass the greater the inertia or the force necessary to move it from a state of rest. Once moving it requires the same amount of force to stop it.

So you can easily imagine that a spaceman, crushed between two girders which on Earth would each weigh a ton but in space, because they are in free fall, are weightless, would suffer from much the same injuries as he would under normal conditions.

Density, of course, is governed by the atomic structure of a mass. For example, lead is much denser than water because lead contains far more atomic particles in an equal volume.

SOME DON'T . . .

I appreciate your policy of publishing stories by new authors, but keep your regular contributors, too. What I don't appreciate so much is the over-loading with scientific articles. Anyone who is interested can read all about the latest scientific developments in scientific journals in the Public Libraries.

George Powell, 13 Bath Road,
Hounslow, Middlesex.

Over-loading, George? Hardly.

PEN FRIEND WANTED

After reading so many letters in your readers' column, I feel that I must give my opinion, too. My first and only grudge is that I think your interior photographs are still a bit hazy, but I suppose you cannot print good photographs on the type of paper used.

The articles are very interesting and I think that the stories are of a high quality. Could you get some more stories by Bryan Berry?

I am seventeen, and would like a pen friend in the U.S.A. or Canada so as to exchange magazines. L. Morris, 65 Thornhill Road, Handsworth, Birmingham 21.

Would any of our American or Canadian readers like to swap books with Mr. Morris?

LITERARY LINE-UP

In issue 63 "The Shell Game" deserved first place, followed by H. K. Bulmer's "Come to Prestonwell." "The Lady and the Bull" surely isn't up to the McIntosh standard? However, after the first few pages the action picks up.

Of the rest, Eric Wilding's "Unwanted Eden" was excellent; let's have more from him. "Wedding Bells for Sylvia" was good with its difference on science fiction writing. I wonder if that's why some science fiction stories are similar to others?

The article on Silicon was outstandingly good. If there are any intelligent life-forms on Venus, with a silicon chemistry instead of a carbon one, they would be more or less impervious to the heat or cold conditions.

It's a pity that we won't be able to get an observatory into an orbit above the atmosphere in time for the close approach of Mars, next year. We would learn some very interesting things, no doubt.

P. Buckle, 9 Landseer View,
Bramley, Leeds 13.

We would, indeed, Mr. Buckle. But it seems that it's going to take a long time for a fully-equipped observatory to be set up in an orbit around the Earth. Perhaps by the time such a feat is possible it will be cheaper and easier to build it on the Moon. On the far side, naturally.

EXPLANATION WANTED

There is a question which worries me a lot when reading space stories and I would very much appreciate your supplying an explanation.

In many stories, and presumably this will be the method used when space flight becomes a reality, the vessel travels through the vacuum of space on the momentum gained during the thrust against earth and through the atmosphere of the planet. The engines are cut off, and the vessel is travelling as described. When acceleration is required, the motors are put into action again for this purpose. Now, assuming that a rocket-type engine is used, surely the thrust for speed is derived from the exhaust "pushing" against something, i.e., the atmosphere. There is nothing tangible in a vacuum, and I would think that whatever type of drive is used, there would have to be something for it to push against.

I haven't been a science fiction reader for very long, and it is probable that I have got my facts all wrong. Could you help? Some time ago there was talk of having a "Questions and Answers" department in the magazine, and this, I hope, will be established, as there are many things that I would like to get clear.

In issue No. 57, a girl wrote to Projectiles thinking that she was the only female SF fan. Obviously she was wrong, but I, personally, know of no other reader who is of my own sex. There must be some in Birmingham, somewhere. But

where? If there are any girl readers of science fiction, or any science fiction clubs here, would they contact me?

Catherine Smith, 86 Florence Road, Acocks Green, Birmingham 27

I am sure they will, Catherine; in fact that's probably them you hear knocking on the door right now. As for your question, knowingly or not, you are talking about the oldest chestnut in the field, and it is probably because you have not been reading science fiction for very long that you are still suffering from the delusion that, in order to work at all, rockets must have something to "push" against.

Have you ever fired a rifle? If you have, you know that when the bullet leaves the muzzle the weapon kicks against your shoulder. That is because of the recoil, the reaction of the expanding gases which press back against the breech. The gases press just as hard against the bullet, but the bullet is a lot lighter than the rifle and so travels much faster.

A rocket engine works in the same way. Fuel is exploded in the rocket tube and the resultant gases are expelled through the venturi. The explosion of the fuel results in pressure against both the gases, known as the exhaust, and the rocket ship itself. In effect, then, the rocket ship works by "pushing" against its own exhaust and so needs no planet, atmosphere, or tangible object around it before it can work. In fact, the reverse is the case. Rocket ships work better in a vacuum because there is nothing to slow them down by friction.

If you are still a little hazy, watch the review column for books which could help you to understand a little better. Don't feel badly about not knowing all the answers; the two books on high-level and high-speed flying reviewed this issue will clear up a lot of the mystery.

And don't hesitate to write in with your questions.

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